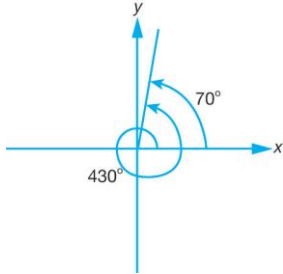


**Tingkatan 5 Bab 6  
Fungsi Trigonometri  
Penyelesaian Lengkap**

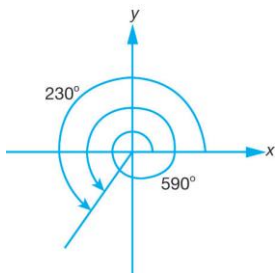
**Praktis Formatif 6.1**

1 (a)



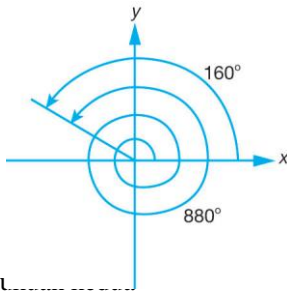
Sukuan pertama

(b)



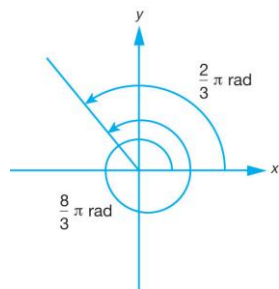
Sukuan ketiga

(c)



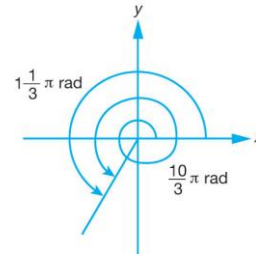
Su.....

(d)



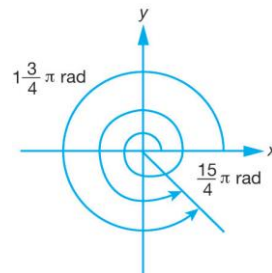
Sukuan kedua

(e)



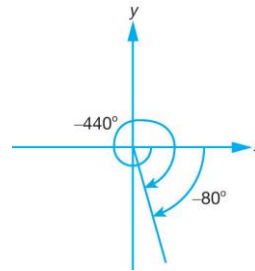
Sukuan ketiga

(f)



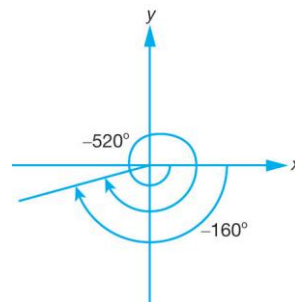
Sukuan keempat

2 (a)



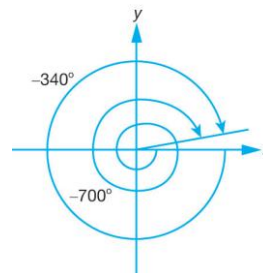
Sukuan keempat

(b)



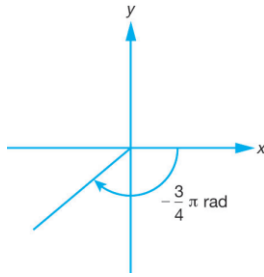
Sukuan ketiga

(c)



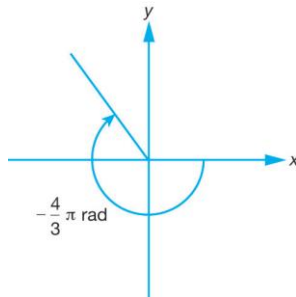
Sukuan pertama

(d)



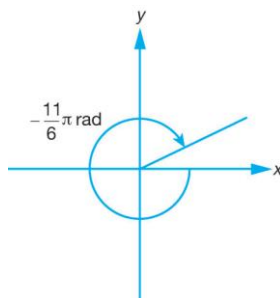
Sukuan ketiga

(e)



Sukuan kedua

(f)



Sukuan pertama

### Praktis Formatif 6.2

$$1 \text{ (a) } \tan 15^\circ = \frac{\sin 15^\circ}{\cos 15^\circ} = \frac{0.2588}{0.9659} = 0.2679$$

$$(b) \cot 15^\circ = \frac{\cos 15^\circ}{\sin 15^\circ} = \frac{0.9659}{0.2588} = 3.7322$$

$$(c) \sec 15^\circ = \frac{1}{\cos 15^\circ} = \frac{1}{0.9659} = 1.0353$$

$$(d) \operatorname{cosec} 15^\circ = \frac{1}{\sin 15^\circ} = \frac{1}{0.2588} = 3.8640$$

$$2 \text{ (a) } \tan \frac{2}{3}\pi = \frac{\sin \frac{2}{3}\pi}{\cos \frac{2}{3}\pi} = \frac{0.8660}{-0.5} = -1.732$$

$$(b) \cot \frac{2}{3}\pi = \frac{\cos \frac{2}{3}\pi}{\sin \frac{2}{3}\pi} = \frac{-0.5}{0.8660} = -0.5774$$

$$(c) \sec \frac{2}{3}\pi = \frac{1}{\cos \frac{2}{3}\pi} = \frac{1}{-0.5} = -2$$

$$(d) \operatorname{cosec} \frac{2}{3}\pi = \frac{1}{\sin \frac{2}{3}\pi} = \frac{1}{0.8660} = 1.1547$$

$$3 \text{ (a) } \tan 30^\circ = \frac{\sin 30^\circ}{\cos 30^\circ} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}}$$

$$(b) \cot 30^\circ = \frac{\cos 30^\circ}{\sin 30^\circ} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$$

$$(c) \sec 30^\circ = \frac{1}{\cos 30^\circ} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}}$$

$$(d) \operatorname{cosec} 30^\circ = \frac{1}{\sin 30^\circ} = \frac{1}{\frac{1}{2}} = 2$$

$$4 \text{ (a) } \begin{aligned} \cos 150^\circ &= -\cos (180^\circ - 150^\circ) \\ &= -\cos 30^\circ \\ &= -\frac{\sqrt{3}}{2} \end{aligned}$$

$$(b) \begin{aligned} \sin 225^\circ &= -\sin (225^\circ - 180^\circ) \\ &= -\sin 45^\circ \\ &= -\frac{1}{\sqrt{2}} \end{aligned}$$

$$(c) \begin{aligned} \tan 240^\circ &= \tan (240^\circ - 180^\circ) \\ &= \tan 60^\circ \\ &= \sqrt{3} \end{aligned}$$

$$\begin{aligned}
 \text{(d) } \cos\left(\frac{7}{4}\pi\right) &= \cos\left(\frac{7}{4}\times 180^\circ\right) \\
 &= \cos 315^\circ \\
 &= \cos(360^\circ - 315^\circ) \\
 &= \cos 45^\circ \\
 &= \frac{1}{\sqrt{2}}
 \end{aligned}$$

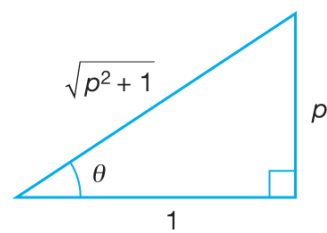
$$\begin{aligned}
 \text{(e) } \operatorname{kosek} 135^\circ &= \frac{1}{\sin 135^\circ} \\
 &= \frac{1}{\sin(180^\circ - 135^\circ)} \\
 &= \frac{1}{\sin 45^\circ} \\
 &= \frac{1}{\frac{1}{\sqrt{2}}} \\
 &= \sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{(f) } \operatorname{sek} 570^\circ &= \operatorname{sek}(570^\circ - 360^\circ) \\
 &= \operatorname{sek}(210^\circ) \\
 &= \frac{1}{\cos 210^\circ} \\
 &= \frac{1}{-\cos(210^\circ - 180^\circ)} \\
 &= \frac{1}{-\cos 30^\circ} \\
 &= -\frac{1}{\frac{\sqrt{3}}{2}} \\
 &= -\frac{2}{\sqrt{3}}
 \end{aligned}$$

$$\begin{aligned}
 \text{(g) } \operatorname{kot} 870^\circ &= \operatorname{kot}(870^\circ - 720^\circ) \\
 &= \operatorname{kot} 150^\circ \\
 &= \frac{1}{-\tan(180^\circ - 150^\circ)} \\
 &= \frac{1}{-\tan(30^\circ)} \\
 &= -\frac{1}{\frac{1}{\sqrt{3}}} \\
 &= -\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{(h) } \operatorname{kosek}\left(-\frac{11}{3}\pi\right) &= \operatorname{kosek}\left(-\frac{11}{3}\times 180^\circ\right) \\
 &= \operatorname{kosek}(-660^\circ) \\
 &= \operatorname{kosek}(-660^\circ + 720^\circ) \\
 &= \operatorname{kosek}(60^\circ) \\
 &= \frac{1}{\sin 60^\circ} \\
 &= \frac{1}{\frac{\sqrt{3}}{2}} \\
 &= \frac{2}{\sqrt{3}}
 \end{aligned}$$

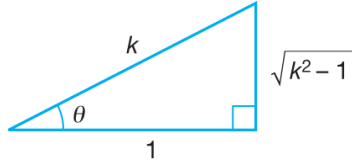
5



$$\begin{aligned}
 \text{(a) } \operatorname{kosek} \theta &= \frac{1}{\sin \theta} \\
 &= \frac{1}{\frac{p}{\sqrt{p^2 + 1}}} \\
 &= \frac{\sqrt{p^2 + 1}}{p}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } \cos(-\theta) &= \cos \theta \\
 &= \frac{1}{\sqrt{p^2 + 1}}
 \end{aligned}$$

6



$$\begin{aligned} \text{(a) } \sin(-\theta) &= -\sin \theta \\ &= -\frac{\sqrt{k^2 - 1}}{k} \end{aligned}$$

$$\begin{aligned} \text{(b) } \operatorname{sek}(-\theta) &= \frac{1}{\operatorname{kos}(-\theta)} \\ &= \frac{1}{\operatorname{kos} \theta} \\ &= \frac{1}{\frac{1}{k}} \\ &= k \end{aligned}$$

$$\begin{aligned} \text{(c) } \operatorname{kot}(-\theta) &= \frac{1}{\tan(-\theta)} \\ &= \frac{1}{-\tan \theta} \\ &= -\frac{1}{\sqrt{k^2 - 1}} \end{aligned}$$

$$7 \text{ (a) } \sin 2\theta = 0.5278$$

$$\begin{aligned} \angle \text{ asas} &= 31.86^\circ \\ 2\theta &= 31.86^\circ, 148.14^\circ, 391.86^\circ, 508.14^\circ \\ \theta &= 15.93^\circ, 74.07^\circ, 195.93^\circ, 254.07^\circ \end{aligned}$$

$$\text{(b) } \operatorname{kos} 2\theta = -0.4630$$

$$\begin{aligned} \angle \text{ asas} &= 62.42^\circ \\ 2\theta &= 117.58^\circ, 242.42^\circ, 477.58^\circ, 602.42^\circ \\ \theta &= 58.79^\circ, 121.21^\circ, 238.79^\circ, 301.21^\circ \end{aligned}$$

$$\text{(c) } \tan 2\theta = -0.4287$$

$$\begin{aligned} \angle \text{ asas} &= 23.20^\circ \\ 2\theta &= 156.80^\circ, 336.80^\circ, 516.80^\circ, 696.80^\circ \\ \theta &= 78.40^\circ, 168.40^\circ, 258.40^\circ, 348.40^\circ \end{aligned}$$

$$\text{(d) } \sin 3\theta = -0.4479$$

$$\begin{aligned} \angle \text{ asas} &= 26.61^\circ \\ 3\theta &= 206.61^\circ, 333.39^\circ, 566.61^\circ, \\ &693.39^\circ, 926.61^\circ, 1\,053.39^\circ \\ \theta &= 68.87^\circ, 111.13^\circ, 188.87^\circ, \\ &231.13^\circ, 308.87^\circ, 351.13^\circ \end{aligned}$$

$$\text{(e) } \operatorname{kos} 3\theta = 0.5358$$

$$\begin{aligned} \angle \text{ asas} &= 57.60^\circ \\ 3\theta &= 57.60^\circ, 302.40^\circ, 417.60^\circ, \\ &662.40^\circ, 777.60^\circ, 1\,022.40^\circ \\ \theta &= 19.20^\circ, 100.80^\circ, 139.20^\circ, \\ &220.80^\circ, 259.20^\circ, 340.80^\circ \end{aligned}$$

$$\text{(f) } \tan 3\theta = 1.5849$$

$$\begin{aligned} \angle \text{ asas} &= 57.75^\circ \\ 3\theta &= 57.75^\circ, 237.75^\circ, 417.75^\circ, \\ &597.75^\circ, 777.75^\circ, 957.75^\circ \\ \theta &= 19.25^\circ, 79.25^\circ, 139.25^\circ, \\ &199.25^\circ, 259.25^\circ, 319.25^\circ \end{aligned}$$

$$8 \text{ (a) } \sin x = \operatorname{kos} 65^\circ$$

$$\sin x = \sin(90^\circ - 65^\circ)$$

$$\sin x = \sin 25^\circ$$

$$\angle \text{ asas} = 25^\circ$$

$$x = 25^\circ, 155^\circ$$

$$\text{(b) } \operatorname{kos} x = \sin 47^\circ$$

$$\operatorname{kos} x = \operatorname{kos}(90^\circ - 47^\circ)$$

$$\operatorname{kos} x = \operatorname{kos} 43^\circ$$

$$\angle \text{ asas} = 43^\circ$$

$$x = 43^\circ, 317^\circ$$

$$\text{(c) } \tan x = \operatorname{kot} 83^\circ$$

$$\tan x = \tan(90^\circ - 83^\circ)$$

$$\tan x = \tan 7^\circ$$

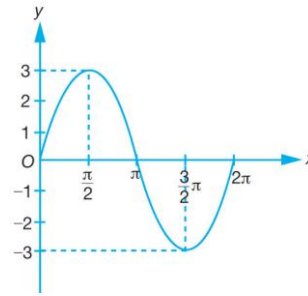
$$\angle \text{ asas} = 7^\circ$$

$$x = 7^\circ, 187^\circ$$

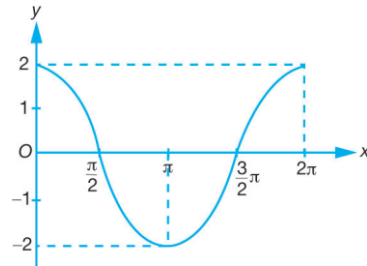
**Praktis Formatif 6.3a**

- (d)  $\sec x = \operatorname{kosek} 56^\circ$   
 $\sec x = \sec (90^\circ - 56^\circ)$   
 $\sec x = \sec 34^\circ$   
 $\angle \text{asas} = 34^\circ$   
 $x = 34^\circ, 326^\circ$
- (e)  $\sec x = -\operatorname{kosek} 48^\circ$   
 $\sec x = -\sec (90^\circ - 48^\circ)$   
 $\sec x = -\sec 42^\circ$   
 $\angle \text{asas} = 42^\circ$   
 $x = 138^\circ, 222^\circ$
- (f)  $\sin 2x = -\operatorname{kos} 66^\circ$   
 $\sin 2x = -\sin (90^\circ - 66^\circ)$   
 $\sin 2x = -\sin 24^\circ$   
 $\angle \text{asas} = 24^\circ$   
 $2x = 204^\circ, 336^\circ, 564^\circ, 696^\circ$   
 $x = 102^\circ, 168^\circ, 282^\circ, 348^\circ$
- (g)  $\operatorname{kos} 2x = -\sin 72^\circ$   
 $\operatorname{kos} 2x = -\operatorname{kos} (90^\circ - 72^\circ)$   
 $\operatorname{kos} 2x = -\operatorname{kos} 18^\circ$   
 $\angle \text{asas} = 18^\circ$   
 $2x = 162^\circ, 198^\circ, 522^\circ, 558^\circ$   
 $x = 81^\circ, 99^\circ, 261^\circ, 279^\circ$
- (h)  $\tan 3x = \operatorname{kot} 57^\circ$   
 $\tan 3x = \tan (90^\circ - 57^\circ)$   
 $\tan 3x = \tan 33^\circ$   
 $\angle \text{asas} = 33^\circ$   
 $3x = 33^\circ, 213^\circ, 393^\circ, 573^\circ, 753^\circ, 933^\circ$   
 $x = 11^\circ, 71, 131^\circ, 191^\circ, 251^\circ, 311^\circ$

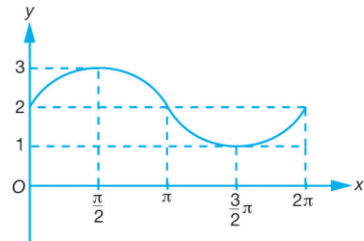
1 (a)



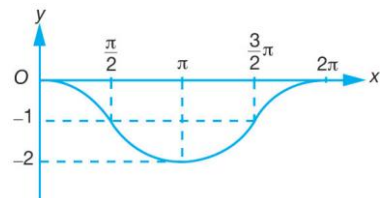
(b)



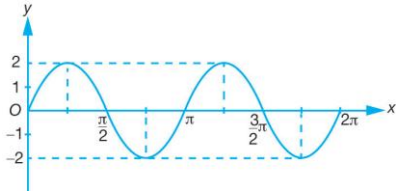
(c)



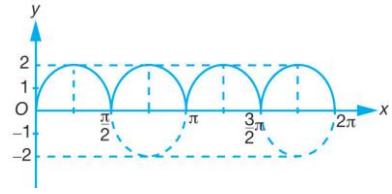
(d)



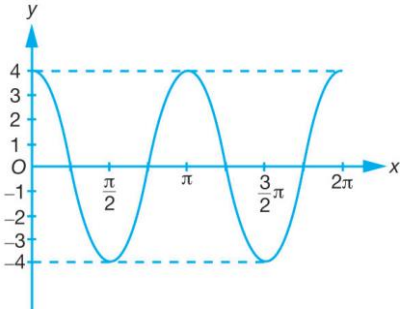
2 (a)



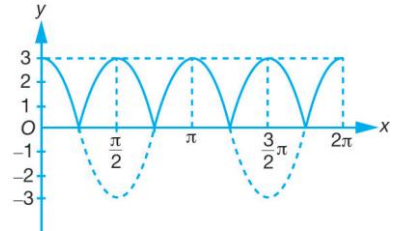
(e)



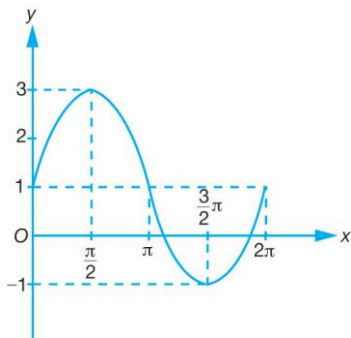
(b)



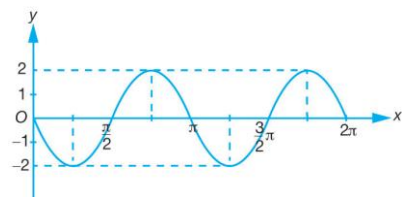
(f)



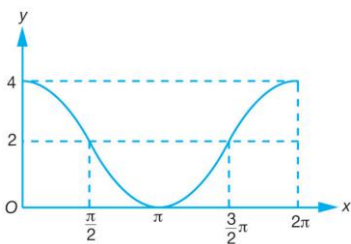
(c)



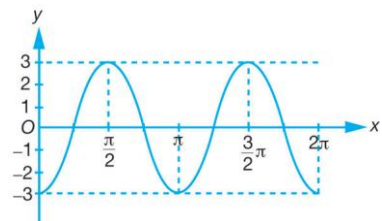
(g)



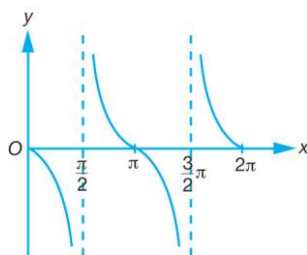
(d)



(h)

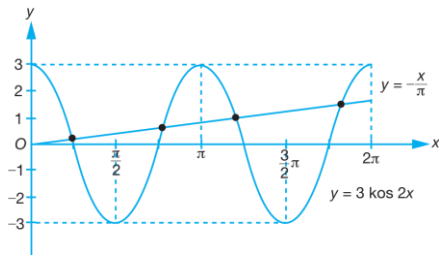


(i)



### Praktis Formatif 6.3b

1

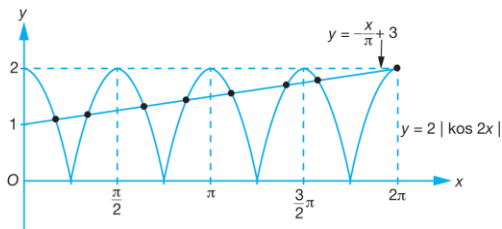


$$3\pi \cos 2x = x$$

$$3 \cos 2x = \frac{x}{\pi}$$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 4

2



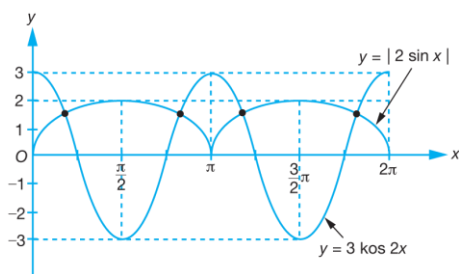
$$2\pi(2|\cos 2x| - 1) = x$$

$$2|\cos 2x| - 1 = \frac{x}{2\pi}$$

$$2|\cos 2x| = \frac{x}{2\pi} + 1$$

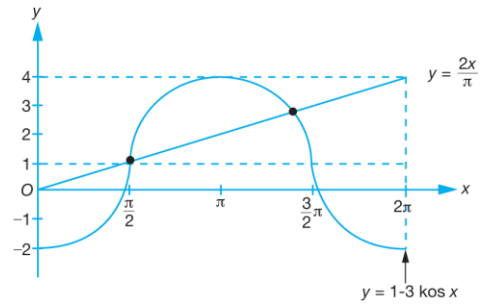
Bilangan penyelesaian  
= Bilangan titik persilangan  
= 8

3



Bilangan penyelesaian  
= Bilangan titik persilangan  
= 4

4 (a)



$$(b) \pi - 3\pi \cos x = 2x$$

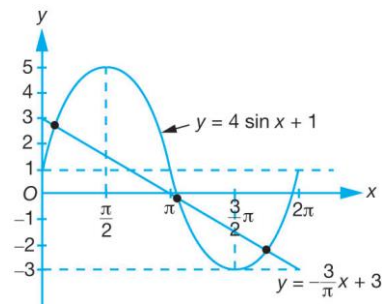
$$\pi(1 - 3 \cos x) = 2x$$

$$1 - 3 \cos x = \frac{2x}{\pi}$$

$$\text{Lakar garis lurus } y = \frac{2x}{\pi}$$

(c) Bilangan penyelesaian  
= Bilangan titik persilangan  
= 2

5 (a)



$$(b) 4\pi \sin x = 2\pi - 3x$$

$$4 \sin x = \frac{2\pi - 3x}{\pi}$$

$$4 \sin x + 1 = \frac{2\pi - 3x}{\pi} + 1$$

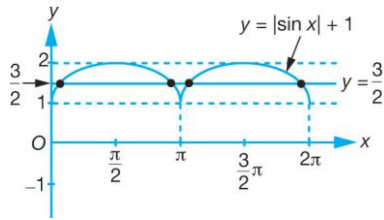
$$4 \sin x + 1 = 2 - \frac{3}{\pi}x + 1$$

$$4 \sin x + 1 = 3 - \frac{3}{\pi}x$$

$$\text{Lakar garis lurus } y = -\frac{3}{\pi}x + 3$$

(c) Bilangan penyelesaian  
= Bilangan titik persilangan  
= 3

6 (a)



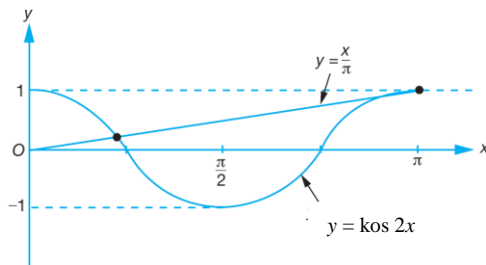
(b)  $|2 \sin x| + 2 = 3$

$$|\sin x| + 1 = \frac{3}{2}$$

Lakar garis lurus  $y = \frac{3}{2}$

(c) Bilangan penyelesaian  
= Bilangan titik persilangan  
= 4

7 (a)



(b)  $\pi \cos 2x - x = 0$

$$\pi \cos 2x = x$$

$$\cos 2x = \frac{x}{\pi}$$

Lakar garis lurus  $y = \frac{x}{\pi}$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 2

### Praktis Formatif 6.4

1 (a) Sebelah kiri

$$= \frac{\tan^2 \theta}{1 + \tan^2 \theta}$$

$$= \frac{\tan^2 \theta}{\sec^2 \theta}$$

$$= \frac{\sin^2 \theta}{\cos^2 \theta}$$

$$= \frac{1}{\cos^2 \theta}$$

$$= \sin^2 \theta$$

= Sebelah kanan

(b) Sebelah kiri

$$= \frac{\sec \theta}{\sec \theta - \cos \theta}$$

$$= \frac{1}{\cos \theta}$$

$$= \frac{1}{\frac{1}{\cos \theta} - \cos \theta}$$

$$= \frac{1}{\cos \theta}$$

$$= \frac{1}{1 - \cos^2 \theta}$$

$$= \frac{1}{\sin^2 \theta}$$

$$= \operatorname{cosec}^2 \theta$$

= Sebelah kanan

(c) Sebelah kiri

$$= \sin \theta \tan \theta + \cos \theta$$

$$= \sin \theta \left( \frac{\sin \theta}{\cos \theta} \right) + \cos \theta$$

$$= \frac{\sin^2 \theta + \cos^2 \theta}{\cos \theta}$$

$$= \frac{1}{\cos \theta}$$

$$= \sec \theta$$

= Sebelah kanan



$$\begin{aligned}
\text{(d) Sebelah kiri} &= \tan \theta + \cot \theta \\
&= \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} \\
&= \frac{\sin^2 \theta + \cos^2 \theta}{\sin \theta \cos \theta} \\
&= \frac{1}{\sin \theta \cos \theta} \\
&= \text{kosek } \theta \text{ sek } \theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
\text{(e) Sebelah kiri} &= (\sin \theta + \cos \theta)^2 + (\sin \theta - \cos \theta)^2 \\
&= \sin^2 \theta + \cos^2 \theta + 2 \sin \theta \cos \theta + \\
&\quad \sin^2 \theta + \cos^2 \theta - 2 \sin \theta \cos \theta \\
&= 1 + 1 \\
&= 2 \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
\text{(f) Sebelah kiri} &= \frac{\text{kosek } \theta}{\text{kosek } \theta - \sin \theta} \\
&= \frac{\frac{1}{\sin \theta}}{\frac{1}{\sin \theta} - \sin \theta} \\
&= \frac{\frac{1}{\sin \theta}}{\frac{1 - \sin^2 \theta}{\sin \theta}} \\
&= \frac{1}{\cos^2 \theta} \\
&= \text{sek}^2 \theta
\end{aligned}$$

$$\begin{aligned}
\text{(g) Sebelah kiri} &= \frac{\sin \theta}{\text{kosek } \theta - \cot \theta} \\
&= \frac{\sin \theta}{\frac{1}{\sin \theta} - \frac{\cos \theta}{\sin \theta}} \\
&= \frac{\sin \theta}{\frac{1 - \cos \theta}{\sin \theta}} \\
&= \frac{\sin^2 \theta}{1 - \cos \theta} \\
&= \frac{1 - \cos^2 \theta}{1 - \cos \theta} \\
&= \frac{(1 + \cos \theta)(1 - \cos \theta)}{1 - \cos \theta}
\end{aligned}$$

$$\begin{aligned}
&= 1 + \cos \theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
\text{(h) Sebelah kiri} &= \frac{1 - \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 - \sin \theta} \\
&= \frac{(1 - \sin \theta)^2 + \cos^2 \theta}{\cos \theta (1 - \sin \theta)} \\
&= \frac{1 - 2 \sin \theta + \sin^2 \theta + \cos^2 \theta}{\cos \theta (1 - \sin \theta)} \\
&= \frac{1 - 2 \sin \theta + 1}{\cos \theta (1 - \sin \theta)} \\
&= \frac{2 - 2 \sin \theta}{\cos \theta (1 - \sin \theta)} \\
&= \frac{2(1 - \sin \theta)}{\cos \theta (1 - \sin \theta)} \\
&= \frac{2}{\cos \theta} \\
&= 2 \text{ sek } \theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
\text{(i) Sebelah kiri} &= \cot^2 \theta - \cos^2 \theta \\
&= \frac{\cos^2 \theta}{\sin^2 \theta} - \cos^2 \theta \\
&= \frac{\cos^2 \theta - \cos^2 \theta \sin^2 \theta}{\sin^2 \theta} \\
&= \frac{\cos^2 \theta (1 - \sin^2 \theta)}{\sin^2 \theta} \\
&= \frac{\cos^2 \theta}{\sin^2 \theta} \times \frac{\cos^2 \theta}{1} \\
&= \cos^2 \theta \cot^2 \theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
\text{(j) Sebelah kiri} &= \frac{1}{1 + \cos \theta} + \frac{1}{1 - \cos \theta} \\
&= \frac{1 - \cos \theta + 1 + \cos \theta}{(1 + \cos \theta)(1 - \cos \theta)} \\
&= \frac{2}{1 - \cos^2 \theta} \\
&= \frac{2}{\sin^2 \theta} \\
&= 2 \text{ kosek}^2 \theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

(k) Sebelah kiri

$$\begin{aligned} &= \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} \\ &= \frac{1 - \tan^2 \theta}{\text{sek}^2 \theta} \\ &= \frac{1 - \frac{\sin^2 \theta}{\text{kos}^2 \theta}}{\frac{1}{\text{kos}^2 \theta}} \\ &= \frac{\text{kos}^2 \theta - \sin^2 \theta}{\text{kos}^2 \theta} \\ &= \frac{1}{\text{kos}^2 \theta} \\ &= \text{kos}^2 \theta - \sin^2 \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

(l) Sebelah kiri

$$\begin{aligned} &= \text{sek}^2 \theta + \text{kot}^2 \theta \\ &= 1 + \tan^2 \theta + \text{kosek}^2 \theta - 1 \\ &= \tan^2 \theta + \text{kosek}^2 \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

### Praktis Formatif 6.5

1 (a)  $\sin 34^\circ \cos 46^\circ + \cos 34^\circ \sin 46^\circ$   
 $= \sin (34^\circ + 46^\circ)$   
 $= \sin 80^\circ$

(b)  $\sin 53^\circ \cos 23^\circ - \cos 53^\circ \sin 23^\circ$   
 $= \sin (53^\circ - 23^\circ)$   
 $= \sin 30^\circ$

(c)  $\cos 63^\circ \cos 48^\circ + \sin 63^\circ \sin 48^\circ$   
 $= \cos (63^\circ - 48^\circ)$   
 $= \cos 15^\circ$

(d)  $\cos 65^\circ \cos 35^\circ - \sin 65^\circ \sin 35^\circ$   
 $= \cos (65^\circ + 35^\circ)$   
 $= \cos 100^\circ$

(e)  $\frac{\tan 27^\circ + \tan 78^\circ}{1 - \tan 27^\circ \tan 78^\circ}$   
 $= \tan (27^\circ + 78^\circ)$   
 $= \tan 105^\circ$

(f)  $\frac{\tan 92^\circ - \tan 26^\circ}{1 + \tan 92^\circ \tan 26^\circ}$   
 $= \tan (92^\circ - 26^\circ)$   
 $= \tan 66^\circ$

2 (a)  $2 \sin 51^\circ \cos 51^\circ$   
 $= \sin 2(51^\circ)$   
 $= \sin 102^\circ$

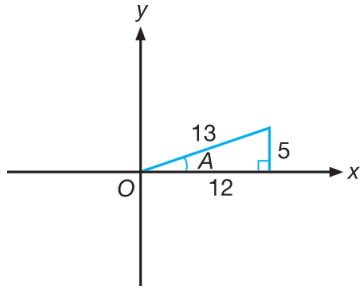
(b)  $\cos^2 62^\circ - \sin^2 62^\circ$   
 $= \cos 2(62^\circ)$   
 $= \cos 124^\circ$

(c)  $2 \cos^2 110^\circ - 1$   
 $= \cos 2(110^\circ)$   
 $= \cos 220^\circ$

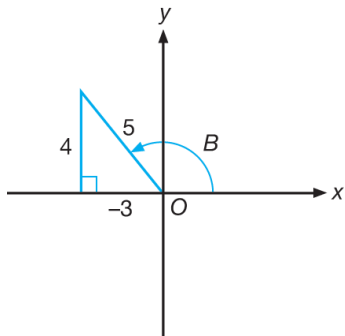
(d)  $1 - 2 \sin^2 85^\circ$   
 $= \cos 2(85^\circ)$   
 $= \cos 170^\circ$

(e)  $\frac{2 \tan 76^\circ}{1 - \tan^2 76^\circ}$   
 $= \tan 2(76^\circ)$   
 $= \tan 152^\circ$

3



$$\sin A = \frac{5}{13}, \quad \cos A = \frac{12}{13}, \quad \tan A = \frac{5}{12}$$



$$\sin B = \frac{4}{5}, \quad \cos B = -\frac{3}{5}, \quad \tan B = -\frac{4}{3}$$

(a)  $\sin (A+B)$ 

$$\begin{aligned} &= \sin A \cos B + \cos A \sin B \\ &= \left(\frac{5}{13}\right)\left(-\frac{3}{5}\right) + \left(\frac{12}{13}\right)\left(\frac{4}{5}\right) \\ &= \frac{33}{65} \end{aligned}$$

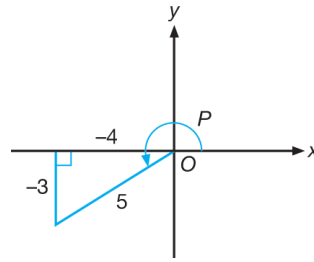
(b)  $\cos (A+B)$ 

$$\begin{aligned} &= \cos A \cos B - \sin A \sin B \\ &= \left(\frac{12}{13}\right)\left(-\frac{3}{5}\right) - \left(\frac{5}{13}\right)\left(\frac{4}{5}\right) \\ &= -\frac{56}{65} \end{aligned}$$

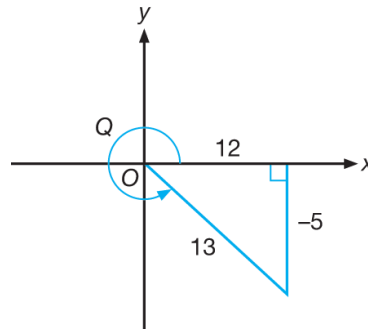
(c)  $\tan (A+B)$ 

$$\begin{aligned} &= \frac{\tan A + \tan B}{1 - \tan A \tan B} \\ &= \frac{\frac{5}{12} + \left(-\frac{4}{3}\right)}{1 - \left(\frac{5}{12}\right)\left(-\frac{4}{3}\right)} \\ &= \frac{-\frac{11}{12}}{\frac{14}{9}} = -\frac{33}{56} \end{aligned}$$

4



$$\sin P = -\frac{3}{5}, \quad \cos P = -\frac{4}{5}, \quad \tan P = \frac{3}{4}$$



$$\sin Q = -\frac{5}{13}, \quad \cos Q = \frac{12}{13}, \quad \tan Q = -\frac{5}{12}$$

(a)  $\sin (P-Q)$ 

$$\begin{aligned} &= \sin P \cos Q - \cos P \sin Q \\ &= \left(-\frac{3}{5}\right)\left(\frac{12}{13}\right) - \left(-\frac{4}{5}\right)\left(-\frac{5}{13}\right) \\ &= -\frac{56}{65} \end{aligned}$$

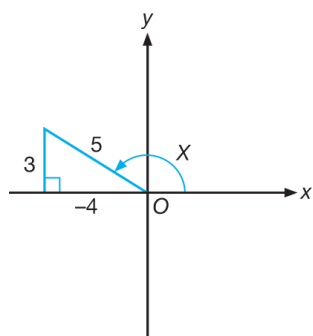
(b)  $\cos (P-Q)$ 

$$\begin{aligned} &= \cos P \cos Q + \sin P \sin Q \\ &= \left(-\frac{4}{5}\right)\left(\frac{12}{13}\right) + \left(-\frac{3}{5}\right)\left(-\frac{5}{13}\right) \\ &= -\frac{33}{65} \end{aligned}$$

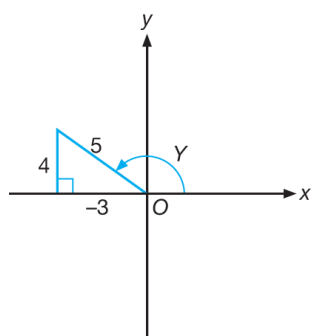
(c)  $\tan (P-Q)$ 

$$\begin{aligned} &= \frac{\tan P - \tan Q}{1 + \tan P \tan Q} \\ &= \frac{\frac{3}{4} - \left(-\frac{5}{12}\right)}{1 + \left(\frac{3}{4}\right)\left(-\frac{5}{12}\right)} \\ &= \frac{\frac{7}{6}}{\frac{11}{16}} = \frac{56}{33} \end{aligned}$$

5



$$\sin X = \frac{3}{5}, \quad \cos X = -\frac{4}{5}, \quad \tan X = -\frac{3}{4}$$

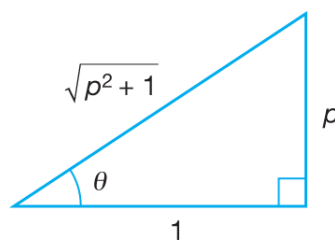


$$\sin Y = \frac{4}{5}, \quad \cos Y = -\frac{3}{5}, \quad \tan Y = -\frac{4}{3}$$

$$(a) \cos 2X = 1 - 2\sin^2 X = 1 - 2\left(\frac{3}{5}\right)^2 = \frac{7}{25}$$

$$\begin{aligned} (b) \sin (2X + Y) &= \sin 2X \cos Y + \cos 2X \sin Y \\ &= 2 \sin X \cos X (\cos Y) + \cos 2X \sin Y \\ &= 2\left(\frac{3}{5}\right)\left(-\frac{4}{5}\right)\left(-\frac{3}{5}\right) + \frac{7}{25}\left(\frac{4}{5}\right) \\ &= \frac{72}{125} + \frac{28}{125} \\ &= \frac{4}{5} \end{aligned}$$

6

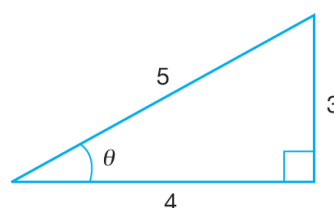


$$(a) \sin \theta = \frac{p}{\sqrt{p^2 + 1}}$$

$$(b) \cos (-\theta) = \cos \theta = \frac{1}{\sqrt{p^2 + 1}}$$

$$\begin{aligned} (c) \cos 2\theta &= 1 - 2\sin^2 \theta \\ &= \frac{p^2 + 1 - 2p^2}{p^2 + 1} \\ &= \frac{1 - p^2}{1 + p^2} \end{aligned}$$

7

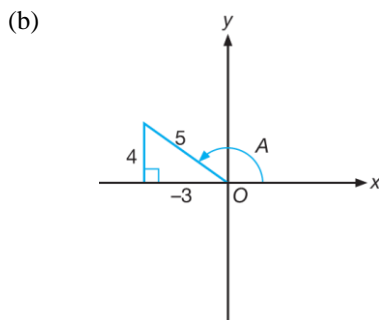


$$\begin{aligned} (a) \cos 2\theta &= 2 \cos^2 \theta - 1 \\ &= 2\left(\frac{4}{5}\right)^2 - 1 \\ &= \frac{7}{25} \end{aligned}$$

$$\begin{aligned} (b) \operatorname{sek} (180^\circ - \theta) &= \frac{1}{\cos (180^\circ - \theta)} \\ &= \frac{1}{\cos 180^\circ \cos \theta + \sin 180^\circ \sin \theta} \\ &= \frac{1}{-\cos \theta + 0} \\ &= -\frac{1}{\frac{4}{5}} \\ &= -\frac{5}{4} \end{aligned}$$

$$\begin{aligned}
 (c) \tan(90^\circ - \theta) &= \cot \theta \\
 &= \frac{1}{\tan \theta} \\
 &= \frac{1}{\frac{3}{4}} \\
 &= \frac{4}{3}
 \end{aligned}$$

$$\begin{aligned}
 8(a) \quad \cos 2A &= -\frac{7}{25} \\
 1 - 2 \sin^2 A &= -\frac{7}{25} \\
 2 \sin^2 A &= \frac{32}{25} \\
 \sin^2 A &= \frac{16}{25} \\
 \sin A &= \frac{4}{5}
 \end{aligned}$$



$$\cos A = -\frac{3}{5}$$

$$(c) \tan A = -\frac{4}{3}$$

$$\begin{aligned}
 9(a) \text{ Sebelah kiri} &= (\sin \theta + \cos \theta)^2 \\
 &= \sin^2 \theta + \cos^2 \theta + 2 \sin \theta \cos \theta \\
 &= 1 + \cos 2\theta \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

$$\begin{aligned}
 (b) \text{ Sebelah kiri} &= \cos^4 \theta - \sin^4 \theta \\
 &= (\cos^2 \theta + \sin^2 \theta)(\cos^2 \theta - \sin^2 \theta) \\
 &= (1)(\cos 2\theta) \\
 &= \cos 2\theta \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

$$\begin{aligned}
 (c) \text{ Sebelah kiri} &= \tan \theta + \cot \theta \\
 &= \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} \\
 &= \frac{\sin^2 \theta + \cos^2 \theta}{\sin \theta \cos \theta} \\
 &= \frac{1}{\sin \theta \cos \theta} \\
 &= \frac{2}{2 \sin \theta \cos \theta} \\
 &= \frac{2}{\sin 2\theta} \\
 &= 2 \operatorname{cosec} 2\theta \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

$$\begin{aligned}
 (d) \text{ Sebelah kiri} &= \frac{2 \sin \theta}{2 \cos \theta - \operatorname{sek} \theta} \\
 &= \frac{2 \sin \theta}{2 \cos \theta - \frac{1}{\cos \theta}} \\
 &= \frac{2 \sin \theta}{\frac{2 \cos^2 \theta - 1}{\cos \theta}} \\
 &= \frac{2 \sin \theta \cos \theta}{\cos 2\theta} \\
 &= \tan 2\theta \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

$$\begin{aligned}
 (e) \text{ Sebelah kiri} &= \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} \\
 &= \frac{1 - \frac{\sin^2 \theta}{\cos^2 \theta}}{\frac{\cos^2 \theta + \sin^2 \theta}{\cos^2 \theta}} \\
 &= \frac{\cos^2 \theta - \sin^2 \theta}{\cos^2 \theta} \\
 &= \frac{1}{\cos^2 \theta} \\
 &= \cos^2 \theta \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

10 (a) Sebelah kiri

$$\begin{aligned} &= \frac{\sin 2\theta}{1 - \cos 2\theta} \\ &= \frac{2 \sin \theta \cos \theta}{1 - (1 - 2 \sin^2 \theta)} \\ &= \frac{2 \sin \theta \cos \theta}{2 \sin^2 \theta} \\ &= \frac{\cos \theta}{\sin \theta} \\ &= \cot \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned} &= \frac{1 + \cos 2\theta}{1 - \cos 2\theta} \\ &= \frac{1 + (2 \cos^2 \theta - 1)}{1 - (1 - 2 \sin^2 \theta)} \\ &= \frac{2 \cos^2 \theta}{2 \sin^2 \theta} \\ &= \frac{\cos^2 \theta}{\sin^2 \theta} \\ &= \cot^2 \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

(c) Sebelah kiri

$$\begin{aligned} &= \frac{\sin \theta + \sin 2\theta}{1 + \cos \theta + \cos 2\theta} \\ &= \frac{\sin \theta + 2 \sin \theta \cos \theta}{1 + \cos \theta + 2 \cos^2 \theta - 1} \\ &= \frac{\sin \theta (1 + 2 \cos \theta)}{\cos \theta (1 + 2 \cos \theta)} \\ &= \frac{\sin \theta}{\cos \theta} \\ &= \tan \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

11 (a) Sebelah kiri

$$\begin{aligned} &= \frac{2(\cos \theta + \sin \theta)}{\sin 2\theta + \cos 2\theta + 1} \\ &= \frac{2(\cos \theta + \sin \theta)}{\sin 2\theta + (2 \cos^2 \theta - 1) + 1} \\ &= \frac{2(\cos \theta + \sin \theta)}{2 \sin \theta \cos \theta + 2 \cos^2 \theta} \\ &= \frac{2(\cos \theta + \sin \theta)}{2 \cos \theta (\sin \theta + \cos \theta)} \\ &= \frac{1}{\cos \theta} \\ &= \sec \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned} &= \frac{\sin \theta}{1 - \cos 2\theta} + \frac{\cos \theta}{1 + \cos 2\theta} \\ &= \frac{\sin \theta}{1 - (1 - 2 \sin^2 \theta)} + \frac{\cos \theta}{1 + (2 \cos^2 \theta - 1)} \\ &= \frac{\sin \theta}{2 \sin^2 \theta} + \frac{\cos \theta}{2 \cos^2 \theta} \\ &= \frac{1}{2 \sin \theta} + \frac{1}{2 \cos \theta} \\ &= \frac{\cos \theta + \sin \theta}{2 \sin \theta \cos \theta} \\ &= \frac{\cos \theta \sin \theta}{\sin 2\theta} \\ &= \text{Sebelah kanan} \end{aligned}$$

(c) Sebelah kiri

$$\begin{aligned} &= \tan 2\theta (2 \cos \theta - \sec \theta) \\ &= \frac{\sin 2\theta}{\cos 2\theta} \left( 2 \cos \theta - \frac{1}{\cos \theta} \right) \\ &= \frac{\sin 2\theta}{\cos 2\theta} \left( \frac{2 \cos^2 \theta - 1}{\cos \theta} \right) \\ &= \frac{2 \sin \theta \cos \theta}{\cos 2\theta} \left( \frac{\cos 2\theta}{\cos \theta} \right) \\ &= 2 \sin \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

12 (a) Sebelah kiri

$$\begin{aligned}
 &= \frac{\cos(A+B)}{\sin A \cos B} \\
 &= \frac{\cos A \cos B - \sin A \sin B}{\sin A \cos B} \\
 &= \frac{\cos A \cos B}{\sin A \cos B} - \frac{\sin A \sin B}{\sin A \cos B} \\
 &= \frac{\cos A}{\sin A} - \frac{\sin B}{\cos B} \\
 &= \cot A - \tan B \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned}
 &= \frac{\cos(A-B) - \cos(A+B)}{\sin(A+B) + \sin(A-B)} \\
 &= \frac{\cos A \cos B + \sin A \sin B - (\cos A \cos B - \sin A \sin B)}{\sin A \cos B + \cos A \sin B + \sin A \cos B - \cos A \sin B} \\
 &= \frac{\sin A \sin B + \sin A \sin B}{\sin A \cos B + \sin A \cos B} \\
 &= \frac{2 \sin A \sin B}{2 \sin A \cos B} \\
 &= \frac{\sin B}{\cos B} \\
 &= \tan B \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

13 (a) Sebelah kiri

$$\begin{aligned}
 &= \frac{1 - \cos \theta}{\sin \theta} \\
 &= \frac{1 - \left(1 - 2 \sin^2 \frac{\theta}{2}\right)}{2 \sin \frac{\theta}{2} \cos \frac{\theta}{2}} \\
 &= \frac{2 \sin^2 \frac{\theta}{2}}{2 \sin \frac{\theta}{2} \cos \frac{\theta}{2}} \\
 &= \frac{\sin \frac{\theta}{2}}{\cos \frac{\theta}{2}} \\
 &= \tan \frac{\theta}{2}
 \end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned}
 &= \frac{1 - \cos \theta}{1 + \cos \theta} \\
 &= \frac{1 - \left(1 - 2 \sin^2 \frac{\theta}{2}\right)}{1 + \left(2 \cos^2 \frac{\theta}{2} - 1\right)} \\
 &= \frac{2 \sin^2 \frac{\theta}{2}}{2 \cos^2 \frac{\theta}{2}} \\
 &= \tan^2 \frac{\theta}{2} \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

### Praktis Formatif 6.6a

1 (a)  $\cot \theta = -2 \cos \theta$

$$\begin{aligned}
 \frac{\cos \theta}{\sin \theta} &= -2 \cos \theta \\
 \cos \theta &= -2 \sin \theta \cos \theta \\
 \cos \theta + 2 \sin \theta \cos \theta &= 0 \\
 \cos \theta (1 + 2 \sin \theta) &= 0 \\
 \cos \theta = 0 &\text{ atau } \sin \theta = -\frac{1}{2} \\
 \theta &= 90^\circ, 270^\circ
 \end{aligned}$$

Apabila  $\cos \theta = 0$ ,

$$\theta = 90^\circ, 270^\circ$$

Apabila  $\sin \theta = -\frac{1}{2}$ ,

$$\begin{aligned}
 \angle \text{ asas} &= 30^\circ \\
 \theta &= 210^\circ, 330^\circ
 \end{aligned}$$

(b)  $3 \sin \theta = \tan \theta$

$$\begin{aligned}
 3 \sin \theta &= \frac{\sin \theta}{\cos \theta} \\
 3 \sin \theta \cos \theta &= \sin \theta \\
 3 \sin \theta \cos \theta - \sin \theta &= 0 \\
 \sin \theta (3 \cos \theta - 1) &= 0 \\
 \sin \theta = 0 &\text{ atau } \cos \theta = \frac{1}{3} \\
 \text{Apabila } \sin \theta = 0, & \\
 \theta &= 0^\circ, 180^\circ, 360^\circ \\
 \text{Apabila } \cos \theta = \frac{1}{3}, & \\
 \angle \text{ asas} &= 70.53^\circ \\
 \theta &= 70.53^\circ, 289.47^\circ
 \end{aligned}$$

(c)  $3 \operatorname{sek} \theta = 4 \operatorname{kos} \theta$

$$\frac{3}{\operatorname{kos} \theta} = 4 \operatorname{kos} \theta$$

$$3 = 4 \operatorname{kos}^2 \theta$$

$$\operatorname{kos}^2 \theta = \frac{3}{4}$$

$$\operatorname{kos} \theta = \pm \frac{\sqrt{3}}{2}$$

$$\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ$$

(d)  $16 \tan \theta = \operatorname{kot} \theta$

$$16 \tan \theta = \frac{1}{\tan \theta}$$

$$\tan^2 \theta = \frac{1}{16}$$

$$\tan \theta = \pm \frac{1}{4}$$

$$\theta = 14.04^\circ, 165.96^\circ, 194.04^\circ, 345.96^\circ$$

2 (a)  $3 \sin^2 \theta - 2 \sin \theta - 1 = 0$

$$(\sin \theta - 1)(3 \sin \theta + 1) = 0$$

$$\sin \theta = 1 \text{ atau } \sin \theta = -\frac{1}{3}$$

Apabila  $\sin \theta = 1$ ,

$$\theta = 90^\circ$$

Apabila  $\sin \theta = -\frac{1}{3}$ ,

$$\angle \text{ asas} = 19.47^\circ$$

$$\theta = 199.47^\circ \text{ atau } 340.53^\circ$$

(b)  $2 \sin \theta = \operatorname{kosek} \theta + 1$

$$2 \sin \theta = \frac{1}{\sin \theta} + 1$$

$$2 \sin^2 \theta = 1 + \sin \theta$$

$$2 \sin^2 \theta - \sin \theta - 1 = 0$$

$$(\sin \theta - 1)(2 \sin \theta + 1) = 0$$

$$\sin \theta = 1 \text{ atau } \sin \theta = -\frac{1}{2}$$

Apabila  $\sin \theta = 1$ ,

$$\theta = 90^\circ$$

Apabila  $\sin \theta = -\frac{1}{2}$ ,

$$\angle \text{ asas} = 30^\circ$$

$$\theta = 210^\circ, 330^\circ$$

(c)  $3 \operatorname{kos}^2 \theta + \sin \theta = 1$

$$3(1 - \sin^2 \theta) + \sin \theta - 1 = 0$$

$$3 - 3 \sin^2 \theta + \sin \theta - 1 = 0$$

$$3 \sin^2 \theta - \sin \theta - 2 = 0$$

$$(\sin \theta - 1)(3 \sin \theta + 2) = 0$$

$$\sin \theta = 1 \text{ atau } \sin \theta = -\frac{2}{3}$$

Apabila  $\sin \theta = 1$ ,

$$\theta = 90^\circ$$

Apabila  $\sin \theta = -\frac{2}{3}$ ,

$$\angle \text{ asas} = 41.81^\circ$$

$$\theta = 221.81^\circ, 318.19^\circ$$

(d)  $5 \sin^2 \theta = 2(1 + \operatorname{kos} \theta)$

$$5(1 - \operatorname{kos}^2 \theta) = 2 + 2 \operatorname{kos} \theta$$

$$5 - 5 \operatorname{kos}^2 \theta - 2 \operatorname{kos} \theta - 2 = 0$$

$$5 \operatorname{kos}^2 \theta + 2 \operatorname{kos} \theta - 3 = 0$$

$$(5 \operatorname{kos} \theta - 3)(\operatorname{kos} \theta + 1) = 0$$

$$\operatorname{kos} \theta = \frac{3}{5} \text{ atau } \operatorname{kos} \theta = -1$$

Apabila  $\operatorname{kos} \theta = \frac{3}{5}$ ,

$$\angle \text{ asas} = 53.13^\circ$$

$$\theta = 53.13^\circ \text{ atau } 306.87^\circ$$

Apabila  $\operatorname{kos} \theta = -1$ ,

$$\theta = 180^\circ$$

(e)  $2 \operatorname{sek} \theta = 1 + \operatorname{kos} \theta$

$$\frac{2}{\operatorname{kos} \theta} = 1 + \operatorname{kos} \theta$$

$$2 = \operatorname{kos} \theta + \operatorname{kos}^2 \theta$$

$$\operatorname{kos}^2 \theta + \operatorname{kos} \theta - 2 = 0$$

$$(\operatorname{kos} \theta - 1)(\operatorname{kos} \theta + 2) = 0$$

$$\operatorname{kos} \theta = 1 \text{ atau } \operatorname{kos} \theta = -2$$

$\operatorname{kos} \theta = -2$  tidak mempunyai

penyelesaian kerana nilai minimum

$\operatorname{kos} \theta = -1$ .

Apabila  $\operatorname{kos} \theta = 1$ ,

$$\theta = 0^\circ, 360^\circ$$



$$(f) \quad 2 \cot \theta = \tan \theta + 1$$

$$\frac{2}{\tan \theta} = \tan \theta + 1$$

$$2 = \tan^2 \theta + \tan \theta$$

$$\tan^2 \theta + \tan \theta - 2 = 0$$

$$(\tan \theta - 1)(\tan \theta + 2) = 0$$

$$\tan \theta = 1 \text{ atau } \tan \theta = -2$$

Apabila  $\tan \theta = 1$ ,

$$\theta = 45^\circ, 225^\circ$$

Apabila  $\tan \theta = -2$ ,

$$\angle \text{ asas} = 63.43^\circ$$

$$\theta = 116.57^\circ, 296.57^\circ$$

$$(g) \quad 3 \sin \theta + 1 = 2 \operatorname{kosek} \theta$$

$$3 \sin \theta + 1 = \frac{2}{\sin \theta}$$

$$3 \sin^2 \theta + \sin \theta - 2 = 0$$

$$(3 \sin \theta - 2)(\sin \theta + 1) = 0$$

$$\sin \theta = \frac{2}{3} \text{ atau } \sin \theta = -1$$

Apabila  $\sin \theta = \frac{2}{3}$ ,

$$\angle \text{ asas} = 41.81^\circ$$

$$\theta = 41.81^\circ, 138.19^\circ$$

Apabila  $\sin \theta = -1$ ,

$$\theta = 270^\circ$$

$$3(a) \quad 3 \operatorname{sek}^2 \theta = 5(1 + \tan \theta)$$

$$3(1 + \tan^2 \theta) = 5 + 5 \tan \theta$$

$$3 + 3 \tan^2 \theta - 5 \tan \theta - 5 = 0$$

$$3 \tan^2 \theta - 5 \tan \theta - 2 = 0$$

$$(\tan \theta - 2)(3 \tan \theta + 1) = 0$$

$$\tan \theta = 2 \text{ atau } \tan \theta = -\frac{1}{3}$$

Apabila  $\tan \theta = 2$ ,

$$\angle \text{ asas} = 63.43^\circ$$

$$\theta = 63.43^\circ, 243.43^\circ$$

Apabila  $\tan \theta = -\frac{1}{3}$ ,

$$\angle \text{ asas} = 18.43^\circ$$

$$\theta = 161.57^\circ, 341.57^\circ$$

$$(b) \quad 2 \cot^2 \theta + 8 = 7 \operatorname{kosek} \theta$$

$$2(\operatorname{kosek}^2 \theta - 1) + 8 - 7 \operatorname{kosek} \theta = 0$$

$$2 \operatorname{kosek}^2 \theta - 2 + 8 - 7 \operatorname{kosek} \theta = 0$$

$$2 \operatorname{kosek}^2 \theta - 7 \operatorname{kosek} \theta + 6 = 0$$

$$(\operatorname{kosek} \theta - 2)(2 \operatorname{kosek} \theta - 3) = 0$$

$$\operatorname{kosek} \theta = 2 \text{ atau } \operatorname{kosek} \theta = \frac{3}{2}$$

Apabila  $\operatorname{kosek} \theta = 2$ ,

$$\frac{1}{\sin \theta} = 2$$

$$\sin \theta = \frac{1}{2}$$

$$\theta = 30^\circ, 150^\circ$$

Apabila  $\operatorname{kosek} \theta = \frac{3}{2}$ ,

$$\frac{1}{\sin \theta} = \frac{3}{2}$$

$$\sin \theta = \frac{2}{3}$$

$$\angle \text{ asas} = 41.81^\circ$$

$$\theta = 41.81^\circ, 138.19^\circ$$

$$4(a) \quad 4 \sin \theta = \operatorname{sek} \theta$$

$$4 \sin \theta = \frac{1}{\operatorname{kos} \theta}$$

$$2(2 \sin \theta \operatorname{kos} \theta) = 1$$

$$2 \sin 2\theta = 1$$

$$\sin 2\theta = \frac{1}{2}$$

$$\angle \text{ asas} = 30^\circ$$

$$2\theta = 30^\circ, 150^\circ, 390^\circ, 510^\circ$$

$$\theta = 15^\circ, 75^\circ, 195^\circ, 255^\circ$$

$$(b) \quad \sin 2\theta + \sin \theta = 0$$

$$2 \sin \theta \operatorname{kos} \theta + \sin \theta = 0$$

$$\sin \theta (2 \operatorname{kos} \theta + 1) = 0$$

$$\sin \theta = 0 \text{ atau } \operatorname{kos} \theta = -\frac{1}{2}$$

Apabila  $\sin \theta = 0$ ,

$$\theta = 0^\circ, 180^\circ, 360^\circ$$

Apabila  $\operatorname{kos} \theta = -\frac{1}{2}$

$$\angle \text{ asas} = 60^\circ$$

$$\theta = 120^\circ, 240^\circ$$

$$\begin{aligned}
(c) \quad 2 \sin \theta &= \tan \theta \\
2 \sin \theta &= \frac{\sin \theta}{\cos \theta} \\
2 \sin \theta \cos \theta &= \sin \theta \\
2 \sin \theta \cos \theta - \sin \theta &= 0 \\
\sin \theta (2 \cos \theta - 1) &= 0 \\
\sin \theta = 0 \text{ atau } \cos \theta &= \frac{1}{2} \\
\text{Apabila } \sin \theta = 0, & \\
\theta &= 0^\circ, 180^\circ, 360^\circ
\end{aligned}$$

$$\begin{aligned}
\text{Apabila } \cos \theta &= \frac{1}{2}, \\
\theta &= 60^\circ, 300^\circ
\end{aligned}$$

$$\begin{aligned}
5 (a) \quad 3 \cos 2\theta + \sin \theta - 2 &= 0 \\
3(1 - 2 \sin^2 \theta) + \sin \theta - 2 &= 0 \\
3 - 6 \sin^2 \theta + \sin \theta - 2 &= 0 \\
6 \sin^2 \theta - \sin \theta - 1 &= 0 \\
(2 \sin \theta - 1)(3 \sin \theta + 2) &= 0 \\
\sin \theta = \frac{1}{2} \text{ atau } \sin \theta &= -\frac{2}{3} \\
\text{Apabila } \sin \theta = \frac{1}{2}, & \\
\theta &= 30^\circ, 150^\circ
\end{aligned}$$

$$\begin{aligned}
\text{Apabila } \sin \theta &= -\frac{2}{3}, \\
\angle \text{ asas} &= 19.47^\circ \\
\theta &= 199.47^\circ, 340.53^\circ
\end{aligned}$$

$$\begin{aligned}
(b) \quad 3 \cos 2\theta + 8 \sin \theta + 5 &= 0 \\
3(1 - 2 \sin^2 \theta) + 8 \sin \theta + 5 &= 0 \\
3 - 6 \sin^2 \theta + 8 \sin \theta + 5 &= 0 \\
6 \sin^2 \theta - 8 \sin \theta - 8 &= 0 \\
3 \sin^2 \theta - 4 \sin \theta - 4 &= 0 \\
(\sin \theta - 2)(3 \sin \theta + 2) &= 0 \\
\sin \theta = 2 \text{ atau } \sin \theta &= -\frac{2}{3} \\
\sin \theta = 2 \text{ tidak mempunyai} & \\
\text{penyelesaian kerana nilai maksimum} & \\
\text{bagi } \sin \theta \text{ ialah } 1. & \\
\sin \theta = -\frac{2}{3} & \\
\angle \text{ asas} &= 41.81^\circ \\
\theta &= 221.81^\circ \text{ atau } 318.19^\circ
\end{aligned}$$

$$\begin{aligned}
(c) \quad \cos 2\theta + \cos \theta &= 0 \\
2 \cos^2 \theta - 1 + \cos \theta &= 0 \\
2 \cos^2 \theta + \cos \theta - 1 &= 0 \\
(2 \cos \theta - 1)(\cos \theta + 1) &= 0 \\
\cos \theta = \frac{1}{2} \text{ atau } \cos \theta &= -1 \\
\text{Apabila } \cos \theta = \frac{1}{2}, & \\
\theta &= 60^\circ, 300^\circ \\
\text{Apabila } \cos \theta = -1, & \\
\theta &= 180^\circ
\end{aligned}$$

$$\begin{aligned}
(d) \quad 6 \cos 2\theta - 17 \cos \theta + 12 &= 0 \\
6(2 \cos^2 \theta - 1) - 17 \cos \theta + 12 &= 0 \\
12 \cos^2 \theta - 6 - 17 \cos \theta + 12 &= 0 \\
12 \cos^2 \theta - 17 \cos \theta + 6 &= 0 \\
(4 \cos \theta - 3)(3 \cos \theta - 2) &= 0 \\
\cos \theta = \frac{3}{4} \text{ atau } \cos \theta &= \frac{2}{3}
\end{aligned}$$

$$\begin{aligned}
\text{Apabila } \cos \theta = \frac{3}{4}, & \\
\angle \text{ asas} &= 41.41^\circ \\
\theta &= 41.41^\circ, 318.59^\circ
\end{aligned}$$

$$\begin{aligned}
\text{Apabila } \cos \theta = \frac{2}{3}, & \\
\angle \text{ asas} &= 48.19^\circ \\
\theta &= 48.19^\circ, 311.81^\circ
\end{aligned}$$

$$\begin{aligned}
6 (a) \quad \cos(\theta + 60^\circ) &= \sin \theta \\
\cos \theta \cos 60^\circ - \sin \theta \sin 60^\circ &= \sin \theta \\
\frac{1}{2} \cos \theta - \frac{\sqrt{3}}{2} \sin \theta &= \sin \theta \\
\frac{1}{2} \cos \theta &= \left(1 + \frac{\sqrt{3}}{2}\right) \sin \theta \\
(2 + \sqrt{3}) \sin \theta &= \cos \theta \\
\frac{\sin \theta}{\cos \theta} &= \frac{1}{(2 + \sqrt{3})} \\
\tan \theta &= 0.2679 \\
\angle \text{ asas} &= 15^\circ \\
\theta &= 15^\circ, 195^\circ
\end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad & 2 \cos(\theta + 30^\circ) = \sin \theta \\
 & 2(\cos \theta \cos 30^\circ - \sin \theta \sin 30^\circ) = \sin \theta \\
 & 2\left(\frac{\sqrt{3}}{2} \cos \theta - \frac{1}{2} \sin \theta\right) = \sin \theta \\
 & \sqrt{3} \cos \theta - \sin \theta = \sin \theta \\
 & \sqrt{3} \cos \theta = 2 \sin \theta \\
 & \frac{\sin \theta}{\cos \theta} = \frac{\sqrt{3}}{2} \\
 & \tan \theta = \frac{\sqrt{3}}{2} \\
 & \angle \text{ asas} = 40.89^\circ \\
 & \theta = 40.89^\circ, 220.89^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad & 4 \sin(\theta - 30^\circ) = \cos \theta \\
 & 4(\sin \theta \cos 30^\circ - \cos \theta \sin 30^\circ) = \cos \theta \\
 & 4\left(\frac{\sqrt{3}}{2} \sin \theta - \frac{1}{2} \cos \theta\right) = \cos \theta \\
 & 2\sqrt{3} \sin \theta - 2 \cos \theta = \cos \theta \\
 & 2\sqrt{3} \sin \theta = 3 \cos \theta \\
 & \frac{\sin \theta}{\cos \theta} = \frac{3}{2\sqrt{3}} \\
 & \tan \theta = 0.8660 \\
 & \angle \text{ asas} = 40.89^\circ \\
 & \theta = 40.89^\circ, 220.89^\circ
 \end{aligned}$$

### Praktis Formatif 6.6b

1  $I = A \sin 120\pi t$

$$120\pi t = 2\pi$$

$$t = \frac{2\pi}{120\pi}$$

$$t = \frac{1}{60}$$

$$\text{Kala} = \frac{1}{60} \text{ saat}$$

2  $y = f(x) = 6 + 2 \sin \frac{\pi}{6} t$

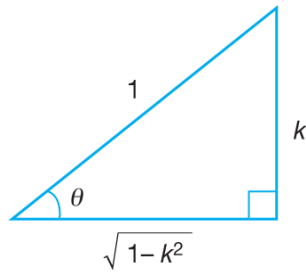
$$\frac{\pi}{6} t = 2\pi$$

$$t = 12$$

$$\text{Kala} = 12 \text{ jam}$$

**Praktis Sumatif 6**

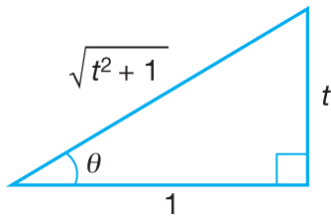
1



(a)  $\tan \theta = \frac{k}{\sqrt{1-k^2}}$

(b)  $\sec(-\theta) = \frac{1}{\cos(-\theta)} = \frac{1}{\cos \theta} = \frac{1}{\sqrt{1-k^2}}$

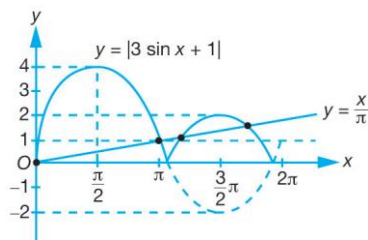
2



(a)  $\cot(-\theta) = \frac{1}{\tan(-\theta)} = -\frac{1}{\tan \theta} = -\frac{1}{t}$

(b)  $\cos(90^\circ - \theta) = \sin \theta = \frac{t}{\sqrt{t^2 + 1}}$

3 (a)



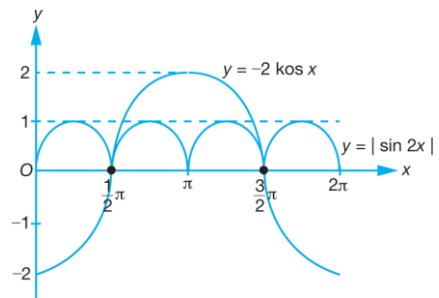
(b)  $\pi|3 \sin x + 1| - x = 0$

$$|3 \sin x + 1| = \frac{x}{\pi}$$

Lakar garis  $y = \frac{x}{\pi}$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 4

4 (a)



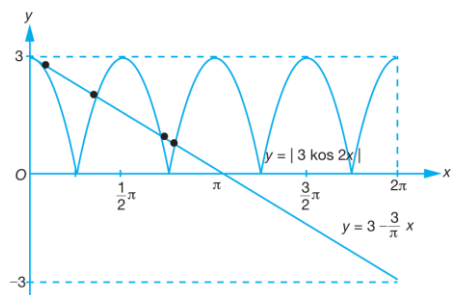
(b)  $|\sin 2x| + 2 \cos x = 0$

$$|\sin 2x| = -2 \cos x$$

Lakar graf  $y = |\sin 2x|$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 2

5 (a)



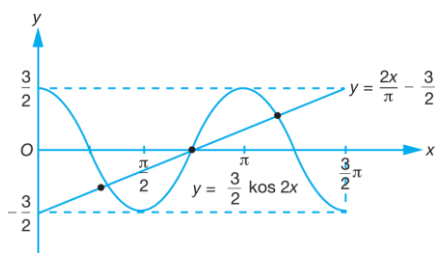
(b)  $3 - |3 \cos 2x| = \frac{3}{\pi} x$

$$|3 \cos 2x| = 3 - \frac{3}{\pi} x$$

Lakar garis lurus  $y = 3 - \frac{3}{\pi} x$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 4

6 (a)



$$(b) \left(\frac{4}{3\pi}\right)x - \cos 2x = 1$$

$$\cos 2x = \left(\frac{4}{3\pi}\right)x - 1$$

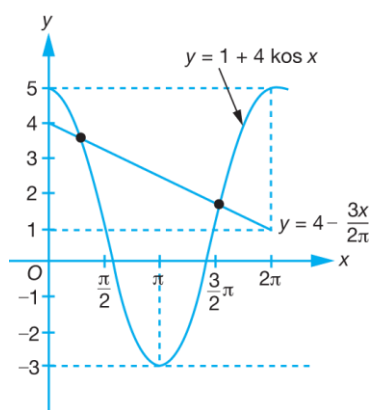
$$\frac{3}{2} \cos 2x = \frac{3}{2} \left[ \left(\frac{4}{3\pi}\right)x - 1 \right]$$

$$\frac{3}{2} \cos 2x = \left(\frac{2}{\pi}\right)x - \frac{3}{2}$$

$$\text{Lakar garis lurus } y = \left(\frac{2}{\pi}\right)x - \frac{3}{2}$$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 3

7 (a)



$$(b) 4\pi \cos x = 3\pi - \frac{3}{2}x$$

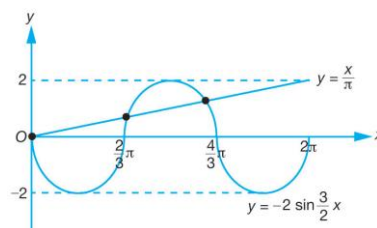
$$4 \cos x = 3 - \frac{3}{2} \left(\frac{x}{\pi}\right)$$

$$1 + 4 \cos x = 4 - \frac{3}{2} \left(\frac{x}{\pi}\right)$$

$$\text{Lakar garis lurus } y = 4 - \frac{3x}{2\pi}$$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 2

8 (a)



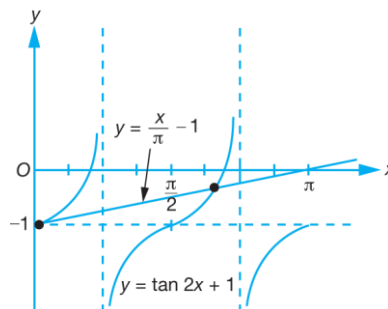
$$(b) \frac{x}{\pi} + 2 \sin \frac{3}{2}x = 0$$

$$\frac{x}{\pi} = -2 \sin \frac{3}{2}x$$

$$\text{Lakar garis lurus } y = \frac{x}{\pi}$$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 3

9 (a)



$$(b) \pi \tan 2x - x = 0$$

$$\pi \tan 2x = x$$

$$\tan 2x = \frac{x}{\pi}$$

$$\tan 2x - 1 = \frac{x}{\pi} - 1$$

$$\text{Lakar garis lurus } y = \frac{x}{\pi} - 1$$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 2

10 (a) Sebelah kiri

$$\begin{aligned} &= (\tan x + \sec x)^2 \\ &= \left( \frac{\sin x}{\cos x} + \frac{1}{\cos x} \right)^2 \\ &= \left( \frac{\sin x + 1}{\cos x} \right)^2 \\ &= \frac{(\sin x + 1)^2}{\cos^2 x} \\ &= \frac{(\sin x + 1)^2}{1 - \sin^2 x} \\ &= \frac{(1 + \sin x)(1 + \sin x)}{(1 + \sin x)(1 - \sin x)} \\ &= \frac{1 + \sin x}{1 - \sin x} \\ &= \text{Sebelah kanan} \end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned} &= \sin x + \sec x \cos^2 x \\ &= \sin x + \frac{\cos^2 x}{\sin x} \\ &= \frac{\sin^2 x + \cos^2 x}{\sin x} \\ &= \frac{1}{\sin x} \\ &= \sec x \\ &= \text{Sebelah kanan} \end{aligned}$$

(c) Sebelah kiri

$$\begin{aligned} &= \frac{\cos x}{1 - \tan x} - \frac{\sin x}{\cot x - 1} \\ &= \frac{\cos x}{1 - \frac{\sin x}{\cos x}} - \frac{\sin x}{\frac{\cos x}{\sin x} - 1} \\ &= \frac{\cos x}{\frac{\cos x - \sin x}{\cos x}} - \frac{\sin x}{\frac{\cos x - \sin x}{\sin x}} \\ &= \frac{\cos^2 x}{\cos x - \sin x} - \frac{\sin^2 x}{\cos x - \sin x} \\ &= \frac{\cos^2 x - \sin^2 x}{\cos x - \sin x} \\ &= \frac{(\cos x + \sin x)(\cos x - \sin x)}{\cos x - \sin x} \\ &= \cos x + \sin x \\ &= \text{Sebelah kanan} \end{aligned}$$

11 (a) Sebelah kiri

$$\begin{aligned} &= \tan \theta \sec \theta - \sin \theta \\ &= \left( \frac{\sin \theta}{\cos \theta} \right) \left( \frac{1}{\cos \theta} \right) - \sin \theta \\ &= \left( \frac{\sin \theta}{\cos^2 \theta} \right) - \sin \theta \\ &= \frac{\sin \theta - (\sin \theta)(\cos^2 \theta)}{\cos^2 \theta} \\ &= \frac{\sin \theta (1 - \cos^2 \theta)}{\cos^2 \theta} \\ &= \frac{\sin \theta (\sin^2 \theta)}{\cos^2 \theta} \\ &= \frac{\sin^3 \theta}{\cos^2 \theta} \\ &= \sin^3 \theta \sec^2 \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned} &= \frac{1 + \cos \theta}{\sin \theta} + \frac{\sin \theta}{1 + \cos \theta} \\ &= \frac{(1 + \cos \theta)^2 + \sin^2 \theta}{\sin \theta (1 + \cos \theta)} \\ &= \frac{1 + 2 \cos \theta + \cos^2 \theta + \sin^2 \theta}{\sin \theta (1 + \cos \theta)} \\ &= \frac{1 + 2 \cos \theta + 1}{\sin \theta (1 + \cos \theta)} \\ &= \frac{2 + 2 \cos \theta}{\sin \theta (1 + \cos \theta)} \\ &= \frac{2(1 + \cos \theta)}{\sin \theta (1 + \cos \theta)} \\ &= \frac{2}{\sin \theta} \\ &= 2 \sec \theta \\ &= \text{Sebelah kanan} \end{aligned}$$

$$\begin{aligned}
& \text{(c) Sebelah kiri} \\
&= \frac{\text{sek } \theta + \text{kosek } \theta}{\tan \theta + \text{kot } \theta} \\
&= \frac{\frac{1}{\text{kos } \theta} + \frac{1}{\sin \theta}}{\frac{\sin \theta}{\text{kos } \theta} + \frac{\text{kot } \theta}{\sin \theta}} \\
&= \frac{\frac{\sin \theta + \text{kot } \theta}{\text{kos } \theta \sin \theta}}{\frac{\sin^2 \theta + \text{kot}^2 \theta}{\text{kos } \theta \sin \theta}} \\
&= \frac{\sin \theta + \text{kot } \theta}{1} \\
&= \sin \theta + \text{kot } \theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
& \mathbf{12} \text{ (a) Sebelah kiri} \\
&= \text{kot } x - \tan x \\
&= \frac{\text{kos } x}{\sin x} - \frac{\sin x}{\text{kos } x} \\
&= \frac{\text{kos}^2 x - \sin^2 x}{\sin x \text{ kos } x} \\
&= \frac{\text{kos } 2x}{\sin x \text{ kos } x} \\
&= \frac{2 \text{ kos } 2x}{2 \sin x \text{ kos } x} \\
&= \frac{2 \text{ kos } 2x}{\sin 2x} \\
&= 2 \text{ kot } 2x \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
& \text{(b) Sebelah kiri} \\
&= \text{kot } x - 2 \text{ kot } 2x \\
&= \frac{\text{kos } x}{\sin x} - 2 \left( \frac{\text{kos } 2x}{\sin 2x} \right) \\
&= \frac{\text{kos } x}{\sin x} - 2 \left( \frac{\text{kos } 2x}{2 \sin x \text{ kos } x} \right) \\
&= \frac{\text{kos } x}{\sin x} - \frac{\text{kos } 2x}{\sin x \text{ kos } x} \\
&= \frac{\text{kos}^2 x - (\text{kos}^2 x - \sin^2 x)}{\sin x \text{ kos } x} \\
&= \frac{\sin^2 x}{\sin x \text{ kos } x} \\
&= \frac{\sin x}{\text{kos } x} \\
&= \tan x \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
& \mathbf{13} \text{ (a) Sebelah kiri} \\
&= \frac{\tan 2x}{1 + \text{sek } 2x} \\
&= \frac{\frac{\sin 2x}{\text{kos } 2x}}{1 + \frac{1}{\text{kos } 2x}} \\
&= \frac{\frac{\sin 2x}{\text{kos } 2x}}{\frac{\text{kos } 2x + 1}{\text{kos } 2x}} \\
&= \frac{\sin 2x}{\text{kos } 2x + 1} \\
&= \frac{\sin 2x}{2 \text{ kos}^2 x - 1 + 1} \\
&= \frac{2 \sin x \text{ kos } x}{2 \text{ kos}^2 x} \\
&= \frac{\sin x}{\text{kos } x} \\
&= \tan x \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
& \text{(b) Sebelah kiri} \\
&= \text{kosek } 2x + \text{kot } 2x \\
&= \frac{1}{\sin 2x} + \frac{\text{kos } 2x}{\sin 2x} \\
&= \frac{1 + \text{kos } 2x}{\sin 2x} \\
&= \frac{1 + 2 \text{ kos}^2 x - 1}{2 \sin x \text{ kos } x} \\
&= \frac{2 \text{ kos}^2 x}{2 \sin x \text{ kos } x} \\
&= \frac{\text{kos } x}{\sin x} \\
&= \text{kot } x \\
&= \text{Sebelah kanan}
\end{aligned}$$

$$\begin{aligned}
& \mathbf{14} \text{ (a) Sebelah kiri} \\
&= \text{kot } x - \text{kot } 2x \\
&= \frac{\text{kos } x}{\sin x} - \frac{\text{kos } 2x}{\sin 2x} \\
&= \frac{\text{kos } x}{\sin x} - \frac{\text{kos } 2x}{2 \sin x \text{ kos } x} \\
&= \frac{2 \text{ kos}^2 x - \text{kos } 2x}{2 \sin x \text{ kos } x} \\
&= \frac{2 \text{ kos}^2 x - (2 \text{ kos}^2 x - 1)}{2 \sin x \text{ kos } x}
\end{aligned}$$

$$\begin{aligned}
&= \frac{1}{2 \sin x \cos x} \\
&= \frac{1}{\sin 2x} \\
&= \text{kosek } 2x \\
&= \text{Sebelah kanan}
\end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned}
&= \text{kosek } x - \frac{2 \cos x \cos 2x}{\sin 2x} \\
&= \frac{1}{\sin x} - \frac{2 \cos x (\cos 2x)}{2 \sin x \cos x} \\
&= \frac{2 \cos x - 2 \cos x \cos 2x}{2 \sin x \cos x} \\
&= \frac{2 \cos x (1 - \cos 2x)}{2 \sin x \cos x} \\
&= \frac{1 - \cos 2x}{\sin x} \\
&= \frac{1 - (1 - 2 \sin^2 x)}{\sin x} \\
&= \frac{2 \sin^2 x}{\sin x} \\
&= 2 \sin x \\
&= \text{Sebelah kanan}
\end{aligned}$$

15 (a) Sebelah kiri

$$\begin{aligned}
&= \tan 2\theta (2 \cos \theta - \sec \theta) \\
&= \frac{\sin 2\theta}{\cos 2\theta} \left( 2 \cos \theta - \frac{1}{\cos \theta} \right) \\
&= \frac{\sin 2\theta}{\cos 2\theta} \left( \frac{2 \cos^2 \theta - 1}{\cos \theta} \right) \\
&= \frac{\sin 2\theta}{\cos 2\theta} \left( \frac{\cos 2\theta}{\cos \theta} \right) \\
&= \frac{2 \sin \theta \cos \theta}{\cos \theta} \\
&= 2 \sin \theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned}
&= \frac{\cos(A-B)}{\sin(A+B)} \\
&= \frac{\cos A \cos B + \sin A \sin B}{\sin A \cos B + \cos A \sin B}
\end{aligned}$$

$$\begin{aligned}
&= \frac{\cos A \cos B}{\cos A \cos B} + \frac{\sin A \sin B}{\cos A \cos B} \\
&= \frac{\sin A \cos B}{\cos A \cos B} + \frac{\cos A \sin B}{\cos A \cos B} \\
&= \frac{1 + \tan A \tan B}{\tan A + \tan B} \\
&= \text{Sebelah kanan}
\end{aligned}$$

16 (a) Sebelah kiri

$$\begin{aligned}
&= 2 \sin(\theta + 45^\circ) \cos(\theta + 45^\circ) \\
&= 2(\sin \theta \cos 45^\circ + \cos \theta \sin 45^\circ) \\
&= (\cos \theta \cos 45^\circ - \sin \theta \sin 45^\circ) \\
&= 2 \left( \frac{\sin \theta}{\sqrt{2}} + \frac{\cos \theta}{\sqrt{2}} \right) \left( \frac{\cos \theta}{\sqrt{2}} - \frac{\sin \theta}{\sqrt{2}} \right) \\
&= 2 \left( \frac{\sin \theta + \cos \theta}{\sqrt{2}} \right) \left( \frac{\cos \theta - \sin \theta}{\sqrt{2}} \right) \\
&= \cos^2 \theta - \sin^2 \theta \\
&= \cos 2\theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

(b) Sebelah kiri

$$\begin{aligned}
&= 2 \cos(\theta + 45^\circ) \cos(\theta - 45^\circ) \\
&= 2(\cos \theta \cos 45^\circ - \sin \theta \sin 45^\circ) \\
&= (\cos \theta \cos 45^\circ + \sin \theta \sin 45^\circ) \\
&= 2 \left( \frac{\cos \theta}{\sqrt{2}} - \frac{\sin \theta}{\sqrt{2}} \right) \left( \frac{\cos \theta}{\sqrt{2}} + \frac{\sin \theta}{\sqrt{2}} \right) \\
&= 2 \left( \frac{\cos \theta - \sin \theta}{\sqrt{2}} \right) \left( \frac{\cos \theta + \sin \theta}{\sqrt{2}} \right) \\
&= \cos^2 \theta - \sin^2 \theta \\
&= \cos 2\theta \\
&= \text{Sebelah kanan}
\end{aligned}$$

17 (a) Sebelah kiri

$$\begin{aligned}
&= (\sec x - \tan x)^2 \\
&= \left( \frac{1}{\cos x} - \frac{\sin x}{\cos x} \right)^2 \\
&= \left( \frac{1 - \sin x}{\cos x} \right)^2 \\
&= \frac{(1 - \sin x)^2}{\cos^2 x} \\
&= \frac{(1 - \sin x)^2}{1 - \sin^2 x} \\
&= \frac{(1 - \sin x)^2}{(1 + \sin x)(1 - \sin x)}
\end{aligned}$$



$$= \frac{1 - \sin x}{1 + \sin x}$$

= Sebelah kanan

(b) Sebelah kiri

$$= \frac{\cos^2 x - \cos 2x}{\sin^2 x + \cos 2x}$$

$$= \frac{\cos^2 x - (\cos^2 x - \sin^2 x)}{\sin^2 x + \cos^2 x - \sin^2 x}$$

$$= \frac{\sin^2 x}{\cos^2 x}$$

$$= \tan^2 x$$

= Sebelah kanan

18 (a)  $\cos 30^\circ = \sqrt{1 - \sin^2 30^\circ} = \sqrt{1 - h^2}$

$\sin 40^\circ = \sqrt{1 - \cos^2 40^\circ} = \sqrt{1 - k^2}$

$\sin 70^\circ$

$$= \sin (30^\circ + 40^\circ)$$

$$= \sin 30^\circ \cos 40^\circ + \cos 30^\circ \sin 40^\circ$$

$$= hk + \sqrt{1 - h^2} \sqrt{1 - k^2}$$

(b)  $\cos 80^\circ = 2 \cos^2 40^\circ - 1 = 2k^2 - 1$

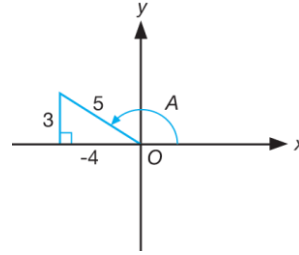
(c)  $\cos 40^\circ = 2 \cos^2 20^\circ - 1$

$$k = 2 \cos^2 20^\circ - 1$$

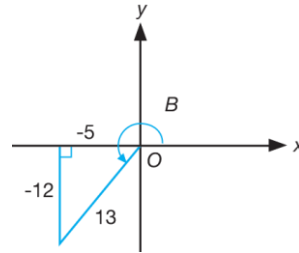
$$\frac{k+1}{2} = \cos^2 20^\circ$$

$$\cos 20^\circ = \sqrt{\frac{k+1}{2}}$$

19



$$\tan A = -\frac{3}{4}$$



$$\tan B = \frac{12}{5}$$

$$\tan (A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$= \frac{-\frac{3}{4} + \frac{12}{5}}{1 - \left(-\frac{3}{4}\right)\left(\frac{12}{5}\right)}$$

$$= \frac{\frac{33}{20}}{\frac{56}{20}}$$

$$= \frac{33}{56}$$

20 (a)  $8 \tan \theta = 3 \cos \theta$

$$\frac{8 \sin \theta}{\cos \theta} = 3 \cos \theta$$

$$8 \sin \theta = 3 \cos^2 \theta$$

$$8 \sin \theta = 3(1 - \sin^2 \theta)$$

$$8 \sin \theta = 3 - 3 \sin^2 \theta$$

$$3 \sin^2 \theta + 8 \sin \theta - 3 = 0$$

$$(3 \sin \theta - 1)(\sin \theta + 3) = 0$$

$$\sin \theta = \frac{1}{3} \text{ atau } \sin \theta = -3$$

$\sin \theta = -3$  tidak diterima kerana nilai minimum  $\sin \theta$  ialah  $-1$ .

Apabila  $\sin \theta = \frac{1}{3}$ ,

$$\angle \text{ asas} = 19.47^\circ$$

$$\theta = 19.47^\circ, 160.53^\circ$$

(b)  $2 \tan \theta + 5 \sin \theta = 0$

$$\frac{2 \sin \theta}{\cos \theta} + 5 \sin \theta = 0$$

$$2 \sin \theta + 5 \sin \theta \cos \theta = 0$$

$$\sin \theta (2 + 5 \cos \theta) = 0$$

$$\sin \theta = 0 \text{ atau } \cos \theta = -\frac{2}{5}$$

Apabila  $\sin \theta = 0$ ,

$$\theta = 0^\circ, 180^\circ, 360^\circ$$

Apabila  $\cos \theta = -\frac{2}{5}$ ,

$$\angle \text{ asas} = 66.42^\circ$$

$$\theta = 113.58^\circ, 246.42^\circ$$

(c)  $3(\cos \theta - \sin \theta) = \sin \theta$

$$3 \cos \theta - 3 \sin \theta = \sin \theta$$

$$3 \cos \theta = 4 \sin \theta$$

$$\frac{\sin \theta}{\cos \theta} = \frac{3}{4}$$

$$\tan \theta = 0.75$$

$$\angle \text{ asas} = 36.87^\circ$$

$$\theta = 36.87^\circ, 216.87^\circ$$

21 (a)  $2 \sin \theta = \text{kosek } \theta$

$$2 \sin \theta = \frac{1}{\sin \theta}$$

$$\sin^2 \theta = \frac{1}{2}$$

$$\sin \theta = \pm \frac{1}{\sqrt{2}}$$

$$\theta = 45^\circ, 135^\circ, 225^\circ, 315^\circ$$

(b)  $\tan \theta = 3 \cot \theta$

$$\frac{\sin \theta}{\cos \theta} = \frac{3 \cos \theta}{\sin \theta}$$

$$\sin^2 \theta = 3 \cos^2 \theta$$

$$\frac{\sin^2 \theta}{\cos^2 \theta} = 3$$

$$\tan^2 \theta = 3$$

$$\tan \theta = \pm \sqrt{3}$$

$$\theta = 60^\circ, 120^\circ, 240^\circ, 300^\circ$$

(c)  $4 \cos \theta = 3 \sec \theta$

$$4 \cos \theta = \frac{3}{\cos \theta}$$

$$\cos^2 \theta = \frac{3}{4}$$

$$\cos \theta = \pm \frac{\sqrt{3}}{2}$$

$$\angle \text{ asas} = 30^\circ$$

$$\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ$$

22 (a)  $2 \sec \theta - \cos \theta = 1$

$$\frac{2}{\cos \theta} - \cos \theta - 1 = 0$$

$$2 - \cos \theta^2 - \cos \theta = 0$$

$$\cos^2 \theta + \cos \theta - 2 = 0$$

$$(\cos \theta - 1)(\cos \theta + 2) = 0$$

$$\cos \theta = 1 \text{ atau } \cos \theta = -2$$

$\cos \theta = -2$  tidak mempunyai

penyelesaian kerana nilai minimum.

Apabila  $\cos \theta = 1$ ,

$$\theta = 0^\circ, 360^\circ$$

(b)  $\cos^2 \theta + 7 \sin^2 \theta + \sin \theta = 2$

$$1 - \sin^2 \theta + 7 \sin^2 \theta + \sin \theta - 2 = 0$$

$$6 \sin^2 \theta + \sin \theta - 1 = 0$$

$$(3 \sin \theta - 1)(2 \sin \theta + 1) = 0$$

$$\sin \theta = \frac{1}{3} \text{ atau } \sin \theta = -\frac{1}{2}$$

Apabila  $\sin \theta = \frac{1}{3}$ ,

$$\angle \text{ asas} = 19.47^\circ$$

$$\theta = 19.47^\circ, 160.53^\circ$$

Apabila  $\sin \theta = -\frac{1}{2}$ ,

$$\theta = 210^\circ, 330^\circ$$

(c)  $\sin \theta (\sin \theta + 1) + \cos \theta (\cos \theta - 2) = 1$

$$\sin^2 \theta + \sin \theta + \cos^2 \theta - 2 \cos \theta - 1 = 0$$

$$1 + \sin \theta - 2 \cos \theta - 1 = 0$$

$$\sin \theta = 2 \cos \theta$$

$$\frac{\sin \theta}{\cos \theta} = 2$$

$$\tan \theta = 2$$

$$\angle \text{ asas} = 63.43^\circ, 243.43^\circ$$

23 (a)  $4 \tan 2x = \cot x$

$$4 \left( \frac{2 \tan x}{1 - \tan^2 x} \right) = \frac{1}{\tan x}$$

$$8 \tan^2 x = 1 - \tan^2 x$$

$$9 \tan^2 x = 1$$

$$\tan^2 x = \frac{1}{9}$$

$$\tan x = \pm \frac{1}{3}$$

$\angle$  asas =  $18.43^\circ$

$$x = 18.43^\circ, 161.57^\circ$$

$$198.43^\circ, 341.57^\circ$$

(b)  $2 \tan \theta = 3 \tan (45^\circ - \theta)$

$$2 \tan \theta = \frac{3 \tan 45^\circ - 3 \tan \theta}{1 + \tan 45^\circ \tan \theta}$$

$$2 \tan \theta = \frac{3 - 3 \tan \theta}{1 + \tan \theta}$$

$$2 \tan \theta + 2 \tan^2 \theta = 3 - 3 \tan \theta$$

$$2 \tan^2 \theta + 5 \tan \theta - 3 = 0$$

$$(2 \tan \theta - 1)(\tan \theta + 3) = 0$$

$$\tan \theta = \frac{1}{2} \text{ atau } \tan \theta = -3$$

Apabila  $\tan \theta = \frac{1}{2}$ ,

$\angle$  asas =  $26.57^\circ$

$$\theta = 26.57^\circ, 206.57^\circ$$

Apabila  $\tan \theta = -3$ ,

$\angle$  asas =  $71.57^\circ$

$$\theta = 108.43^\circ, 288.43^\circ$$

24  $5 \sin x \cos x - \sin x = 0$

$$\sin x (5 \cos x - 1) = 0$$

$$\sin x = 0 \text{ atau } \cos x = \frac{1}{5}$$

Apabila  $\sin x = 0$ ,

$$x = 0^\circ, 180^\circ, 360^\circ$$

Apabila  $\cos x = \frac{1}{5}$ ,

$\angle$  asas =  $78.46^\circ$

$$x = 78.46^\circ, 281.54^\circ$$

25 (a)  $4 \cos 2x + 2 \sin x = 3$

$$4(1 - 2 \sin^2 x) + 2 \sin x - 3 = 0$$

$$4 - 8 \sin^2 x + 2 \sin x - 3 = 0$$

$$8 \sin^2 x - 2 \sin x - 1 = 0$$

$$(2 \sin x - 1)(4 \sin x + 1) = 0$$

$$\sin x = \frac{1}{2} \text{ atau } \sin x = -\frac{1}{4}$$

Apabila  $\sin x = \frac{1}{2}$ ,

$$x = 30^\circ, 150^\circ$$

Apabila  $\sin x = -\frac{1}{4}$ ,

$\angle$  asas =  $14.48^\circ$

$$x = 194.48^\circ, 345.52^\circ$$

(b)  $3 \cos 2x - 10 \cos x + 7 = 0$

$$3(2 \cos^2 x - 1) - 10 \cos x + 7 = 0$$

$$6 \cos^2 x - 3 - 10 \cos x + 7 = 0$$

$$6 \cos^2 x - 10 \cos x + 4 = 0$$

$$3 \cos^2 x - 5 \cos x + 2 = 0$$

$$(\cos x - 1)(3 \cos x - 2) = 0$$

$$\cos x = 1 \text{ atau } \cos x = \frac{2}{3}$$

Apabila  $\cos x = 1$ ,  $x = 0^\circ, 360^\circ$

Apabila  $\cos x = \frac{2}{3}$ ,

$\angle$  asas =  $48.19^\circ$

$$x = 48.19^\circ, 311.81^\circ$$

26 (a)  $\sin \theta = \cos(\theta + 30^\circ)$

$$\sin \theta = \cos \theta \cos 30^\circ - \sin \theta \sin 30^\circ$$

$$\sin \theta = \frac{\sqrt{3}}{2} \cos \theta - \frac{1}{2} \sin \theta$$

$$2 \sin \theta = \sqrt{3} \cos \theta - \sin \theta$$

$$3 \sin \theta = \sqrt{3} \cos \theta$$

$$\frac{\sin \theta}{\cos \theta} = \frac{\sqrt{3}}{3}$$

$$\tan \theta = 0.5774$$

$\angle$  asas =  $30^\circ$

$$\theta = 30^\circ, 210^\circ$$

$$\begin{aligned}
 \text{(b) } \cos \theta &= 4 \cos (\theta - 60^\circ) \\
 \cos \theta &= 4 (\cos \theta \cos 60^\circ + \sin \theta \sin 60^\circ) \\
 \cos \theta &= 4 \left( \frac{\cos \theta}{2} + \frac{\sqrt{3}}{2} \sin \theta \right) \\
 \cos \theta &= 2 \cos \theta + 2\sqrt{3} \sin \theta \\
 -\cos \theta &= 2\sqrt{3} \sin \theta \\
 -\frac{1}{2\sqrt{3}} &= \frac{\sin \theta}{\cos \theta} \\
 \tan \theta &= -0.2886 \\
 \angle \text{ asas} &= 16.10^\circ \\
 \theta &= 163.90^\circ, 343.90^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{27 (a) } 8 \sin x + 3 \sec x &= 0 \\
 8 \sin x + \frac{3}{\cos x} &= 0 \\
 8 \sin x \cos x + 3 &= 0 \\
 4(2 \sin x \cos x) + 3 &= 0 \\
 4 \sin 2x &= -3 \\
 \sin 2x &= -\frac{3}{4} \\
 \angle \text{ asas} &= 48.59^\circ \\
 2x &= 228.59^\circ, 311.41^\circ \\
 x &= 114.30, 155.70^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } 3 \cos^2 x - 3 \sin^2 x - 8 \sin x \cos x &= 0 \\
 (\cos x - 3 \sin x)(3 \cos x + \sin x) &= 0 \\
 \cos x - 3 \sin x &= 0 \text{ atau} \\
 3 \cos x + \sin x &= 0
 \end{aligned}$$

Apabila

$$\begin{aligned}
 \cos x - 3 \sin x &= 0, \\
 \cos x &= 3 \sin x \\
 \frac{\sin x}{\cos x} &= \frac{1}{3} \\
 \tan x &= \frac{1}{3} \\
 \angle \text{ asas} &= 18.43^\circ \\
 x &= 18.43^\circ
 \end{aligned}$$

Apabila

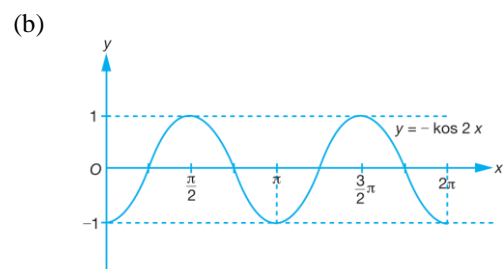
$$\begin{aligned}
 3 \cos x + \sin x &= 0, \\
 3 \cos x &= -\sin x \\
 \frac{\sin x}{\cos x} &= -3 \\
 \tan x &= -3 \\
 \angle \text{ asas} &= 71.57^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{28 (a) Sebelah kiri} & \\
 &= \cot x \sin 2x \\
 &= \left( \frac{\cos x}{\sin x} \right) (2 \sin x \cos x) \\
 &= 2 \cos^2 x \\
 &= \cos 2x + 1 \leftarrow \begin{array}{l} \cos 2x = 2 \cos^2 x - 1 \\ 2 \cos^2 x = \cos 2x + 1 \end{array} \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

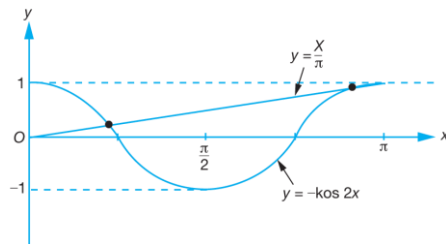
$$\begin{aligned}
 \text{(b) } \cot x \sin 2x &= \frac{2}{3} \\
 \cos 2x + 1 &= \frac{2}{3} \\
 \cos 2x &= -\frac{1}{3} \\
 \angle \text{ asas} &= 70.53^\circ \\
 2x &= 109.47^\circ, 250.53^\circ, \\
 &469.47^\circ, 610.53^\circ \\
 x &= 54.74^\circ, 125.27^\circ, \\
 &234.74^\circ, 305.27^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{29 (a) (i) Sebelah kiri} & \\
 &= 2 \sin (x + 45^\circ) \sin (x - 45^\circ) \\
 &= 2 (\sin x \cos 45^\circ + \cos x \sin 45^\circ) \\
 &\quad (\sin x \cos 45^\circ - \cos x \sin 45^\circ) \\
 &= 2 \left( \frac{\sin x}{\sqrt{2}} + \frac{\cos x}{\sqrt{2}} \right) \left( \frac{\sin x}{\sqrt{2}} - \frac{\cos x}{\sqrt{2}} \right) \\
 &= (\sin x + \cos x)(\sin x - \cos x) \\
 &= \sin^2 x - \cos^2 x \\
 &= -\cos 2x \\
 &= \text{Sebelah kanan}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } 2 \sin (x + 45^\circ) \sin (x - 45^\circ) &= \frac{1}{2} \\
 -\cos 2x &= \frac{1}{2} \\
 \cos 2x &= -\frac{1}{2} \\
 \angle \text{ asas} &= 60^\circ \\
 2x &= 120^\circ, 240^\circ, 480^\circ, 600^\circ \\
 x &= 60^\circ, 120^\circ, 240^\circ, 300^\circ
 \end{aligned}$$



30 (a)



(b)  $1 - 2 \sin^2 x - \frac{x}{\pi} = 0$

$$\cos 2x = \frac{x}{\pi}$$

Lakar garis lurus  $y = \frac{x}{\pi}$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 2

31 (a) Sebelah kiri

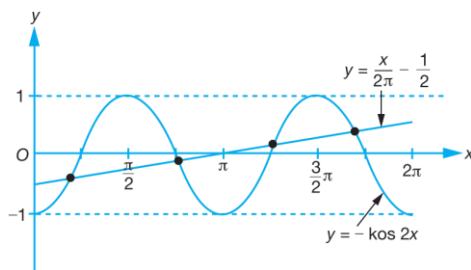
$$\begin{aligned} &= \sec^2 x - \tan^2 x - 2 \cos^2 x \\ &= 1 + \tan^2 x - \tan^2 x - 2 \cos^2 x \\ &= 1 - 2 \cos^2 x \\ &= -(2 \cos^2 x - 1) \\ &= -\cos 2x \\ &= \text{Sebelah kanan} \end{aligned}$$

(b)  $2(\sec^2 x - \tan^2 x - 2 \cos^2 x) = \frac{x}{\pi} - 1$

$$-2 \cos 2x = \frac{x}{\pi} - 1$$

$$-\cos 2x = \frac{x}{2\pi} - \frac{1}{2}$$

Lakar garis lurus  $y = \frac{x}{2\pi} - \frac{1}{2}$

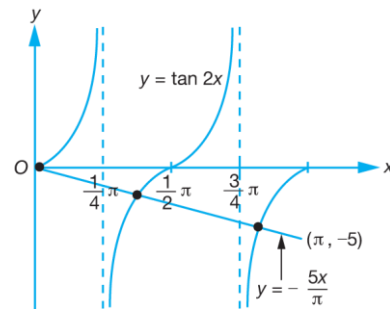


Bilangan penyelesaian  
= Bilangan titik persilangan  
= 4

32 (a) Sebelah kiri

$$\begin{aligned} &= \frac{2 \cot x}{2 - \operatorname{cosec}^2 x} \\ &= \frac{2 \cos x}{\frac{\sin x}{2 - \frac{1}{\sin^2 x}}} \\ &= \frac{2 \cos x}{\frac{\sin x}{2 \sin^2 x - 1}} \\ &= \frac{2 \sin x \cos x}{2 \sin^2 x - 1} \\ &= \frac{\sin 2x}{-(1 - 2 \sin^2 x)} \\ &= \frac{\sin 2x}{-\cos 2x} \\ &= -\tan 2x \\ &= \text{Sebelah kanan} \end{aligned}$$

(b) (i)



(ii)  $\frac{2 \cot x}{2 - \operatorname{cosec}^2 x} - \frac{5x}{\pi} = 0$

$$-\tan 2x = \frac{5x}{\pi}$$

$$\tan 2x = -\frac{5x}{\pi}$$

Lakar garis lurus  $y = -\frac{5x}{\pi}$

Bilangan penyelesaian  
= Bilangan titik persilangan  
= 3

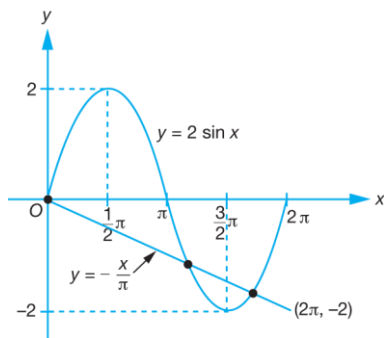
33 (a) Sebelah kiri  
 $= \tan 2x (2 \cos x - \sec x)$   
 $= \frac{\sin 2x}{\cos 2x} \left( 2 \cos x - \frac{1}{\cos x} \right)$   
 $= \frac{2 \sin x \cos x}{\cos 2x} \left( \frac{2 \cos^2 x - 1}{\cos x} \right)$   
 $= \frac{2 \sin x}{\cos 2x} (\cos 2x)$   
 $= 2 \sin x$   
 = Sebelah kanan

(b)  $\pi \tan 2x (2 \cos x - \sec x) + x = 0$

$$\tan 2x (2 \cos x - \sec x) = -\frac{x}{\pi}$$

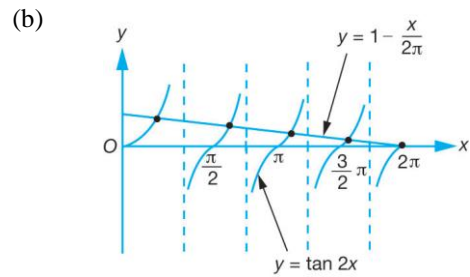
$$2 \sin x = -\frac{x}{\pi}$$

Lakar garis lurus  $y = -\frac{x}{\pi}$



Bilangan penyelesaian  
 = Bilangan titik persilangan  
 = 3

34 (a) Sebelah kiri  
 $= \frac{\sin 2x}{2 \cos^2 x + \cot^2 x - \operatorname{cosec}^2 x}$   
 $= \frac{\sin 2x}{2 \cos^2 x - 1}$   
 $= \frac{\sin 2x}{\cos 2x}$   
 $= \tan 2x$   
 = Sebelah kanan



(c)  $\frac{\sin 2x}{2 \cos^2 x + \cot^2 x - \operatorname{cosec}^2 x} + \frac{x}{2\pi} = 1$

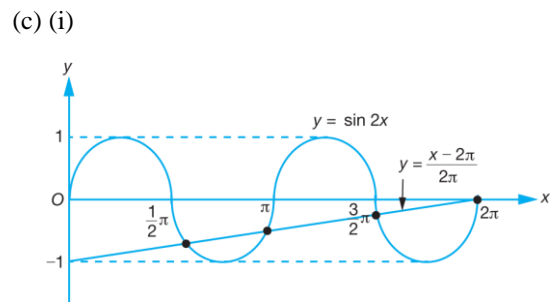
$$\tan 2x = 1 - \frac{x}{2\pi}$$

Lakar garis lurus  $y = 1 - \frac{x}{2\pi}$

Bilangan penyelesaian  
 = Bilangan titik persilangan  
 = 4

35 (a) Sebelah kiri  
 $= 2 \cot x \sin^2 x$   
 $= 2 \left( \frac{\cos x}{\sin x} \right) (\sin^2 x)$   
 $= 2 \sin x \cos x$   
 $= \sin 2x$   
 = Sebelah kanan

(b)  $4 \cot x \sin^2 x = \sqrt{3}$   
 $2 (2 \cot x \sin^2 x) = \sqrt{3}$   
 $2 (\sin 2x) = \sqrt{3}$   
 $\sin 2x = \frac{\sqrt{3}}{2}$   
 $\angle \text{ asas} = 60^\circ$   
 $2x = 60^\circ, 120^\circ, 420^\circ, 480^\circ$   
 $x = 30^\circ, 60^\circ, 210^\circ, 240^\circ$   
 $x = \frac{1}{6}\pi, \frac{1}{3}\pi, \frac{7}{6}\pi, \frac{4}{3}\pi \text{ rad}$



$$(ii) \quad 4\pi \cot x \sin^2 x = x - 2\pi$$

$$2\pi (2 \cot x \sin^2 x) = x - 2\pi$$

$$2\pi \sin 2x = x - 2\pi$$

$$\sin 2x = \frac{x - 2\pi}{2\pi}$$

$$\text{Lakar garis lurus } y = \frac{x - 2\pi}{2\pi}$$

Bilangan penyelesaian

= Bilangan titik persilangan

= 4

$$36 \quad e = 0.014 \cos (2\pi ft)$$

$$2\pi ft = 2\pi$$

$$ft = 1$$

$$t = \frac{1}{f}$$

$$\text{Kala} = \frac{1}{f} = \frac{1}{950\,000} = 1.053 \times 10^{-6} \text{ s}$$