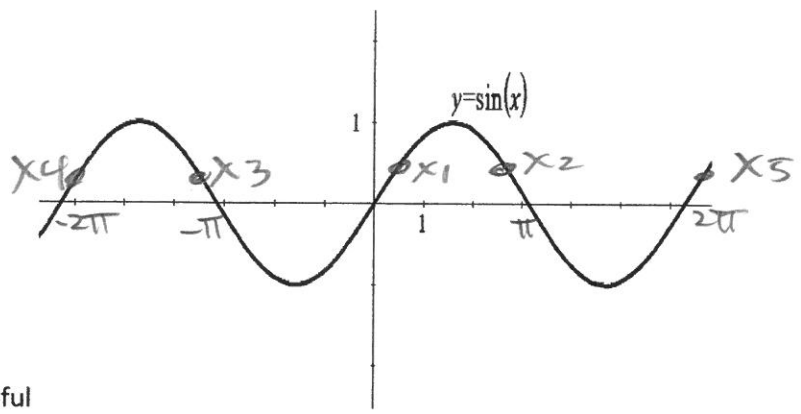


1. Solve the following trigonometric equation  $\frac{-7}{4} \sin(x) + 2 = \frac{3}{2}$

Give three EXACT solutions and their approximations



This may be helpful  
Show necessary work here

(A)  $\frac{-7}{4} \sin x + 2 = \frac{3}{2} = \frac{3}{2} - \frac{2}{2} = \frac{1}{2}$

$x_2 = \pi - \sin^{-1}\left(\frac{2}{7}\right) \approx 2.852 \text{ radians}$

(B)  $\frac{-7}{4} \sin x = -\frac{1}{2}$

$x_3 = -\pi - \sin^{-1}\left(\frac{2}{7}\right) \approx -3.431 \text{ radians}$

$\frac{-4}{7} \left(\frac{7}{4} \sin x\right) = \frac{-4}{7} \left(-\frac{1}{2}\right)$   
 $\sin x = \frac{4}{14}$

$x_4 = -2\pi + \sin^{-1}\left(\frac{2}{7}\right) \approx -5.993 \text{ radians}$

(C)  $\sin x = \frac{2}{7}$

$x_5 = 2\pi + \sin^{-1}\left(\frac{2}{7}\right) \approx 6.573 \text{ radians}$

$x_1 = \sin^{-1}\left(\frac{2}{7}\right) \approx 0.290 \text{ radians}$

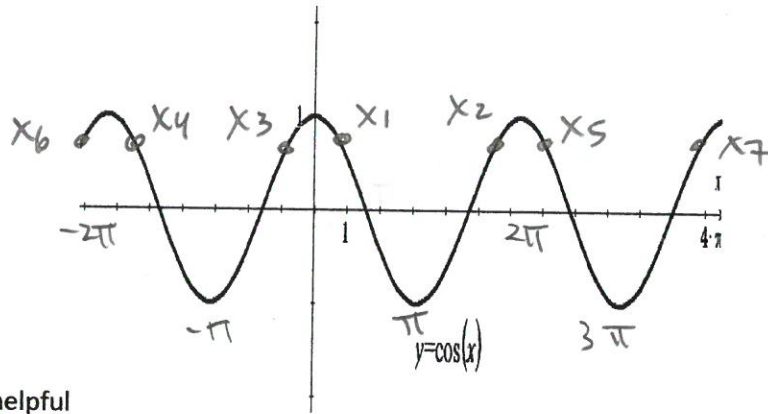
Exact Solution #1  $\sin^{-1}\left(\frac{2}{7}\right)$       Approximation (round to three decimals) 0.290

Exact Solution #2  $\pi - \sin^{-1}\left(\frac{2}{7}\right)$       Approximation (round to three decimals) 2.852

Exact Solution #3  $-\pi - \sin^{-1}\left(\frac{2}{7}\right)$       Approximation (round to three decimals) -3.431

2. Solve the following trigonometric equation  $5 \cos(x) - 1 = \frac{7}{2}$

Give three EXACT solutions and their approximations



This may be helpful

Show necessary work here

(A) 
$$\begin{array}{r} 5 \cos x - 1 = \frac{7}{2} \\ +1 \quad +1 \quad +\frac{7}{2} \end{array}$$

(B) 
$$5 \cos x = \frac{9}{2}$$

$$\frac{5 \cos x}{5} = \frac{9}{2} \cdot \frac{1}{5}$$

(C) 
$$\boxed{\cos x = \frac{9}{10}}$$

$$\boxed{x_1 = \cos^{-1}\left(\frac{9}{10}\right) = 0.451 \text{ radians}}$$

$$\begin{aligned} x_2 &= 2\pi - \cos^{-1}\left(\frac{9}{10}\right) \\ &= 5.832 \text{ radians} \end{aligned}$$

$$\begin{aligned} x_7 &= 4\pi - \cos^{-1}\left(\frac{9}{10}\right) \\ &\approx 12.115 \text{ radians} \end{aligned}$$

$$\begin{aligned} x_3 &= -\cos^{-1}\left(\frac{9}{10}\right) \\ &\approx -0.451 \text{ radians} \end{aligned}$$

$$\begin{aligned} x_4 &= -2\pi + \cos^{-1}\left(\frac{9}{10}\right) \\ &\approx -5.832 \text{ radians} \end{aligned}$$

$$\begin{aligned} x_5 &= 2\pi + \cos^{-1}\left(\frac{9}{10}\right) \\ &\approx 6.734 \text{ radians} \end{aligned}$$

$$\begin{aligned} x_6 &= -2\pi - \cos^{-1}\left(\frac{9}{10}\right) \\ &\approx -6.734 \text{ radians} \end{aligned}$$

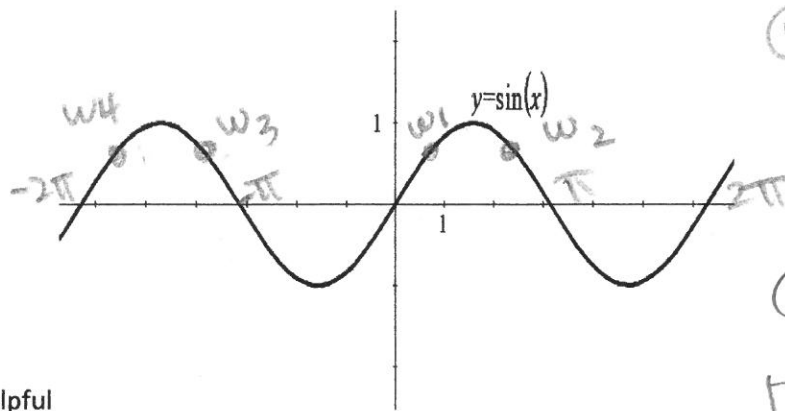
Exact Solution #1  $\cos^{-1}\left(\frac{9}{10}\right)$       Approximation (round to three decimals) 0.451

Exact Solution #2  $2\pi - \cos^{-1}\left(\frac{9}{10}\right)$       Approximation (round to three decimals) 5.832

Exact Solution #3  $-\cos^{-1}\left(\frac{9}{10}\right)$       Approximation (round to three decimals) -0.451

3. Solve the following trigonometric equation  $5 \sin\left(\frac{1}{2}x - \frac{3\pi}{4}\right) - 2 = \frac{1}{2}$

Give three EXACT solutions and their approximations



This may be helpful

Show necessary work here

$$\textcircled{D} \frac{1}{2}x_1 - \frac{3\pi}{4} = \sin^{-1}\left(\frac{1}{2}\right)$$

$$\frac{+3\pi}{4} \quad +3\pi/4$$

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

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

$$x_1 = \frac{3\pi}{2} + 2\sin^{-1}\left(\frac{1}{2}\right)$$

$$\boxed{x_1 = \frac{3\pi}{2} + 2\sin^{-1}\left(\frac{1}{2}\right) \approx 5.760 \text{ radians}}$$

Exact Solution #1

Approximation (round to three decimals) 5.760

Exact Solution #2  $\frac{7\pi}{2} - 2\sin^{-1}\left(\frac{1}{2}\right)$

Approximation (round to three decimals) 9.948

Exact Solution #3  $-\frac{\pi}{2} - 2\sin^{-1}\left(\frac{1}{2}\right)$

Approximation (round to three decimals) -2.618

$$\textcircled{E} \frac{1}{2}x_2 - \frac{3\pi}{4} = \pi - \sin^{-1}\left(\frac{1}{2}\right)$$

$$\frac{+3\pi}{4} \quad +3\pi/4$$

$$\frac{1}{2}x_2 = \frac{7\pi}{4} - \sin^{-1}\left(\frac{1}{2}\right)$$

$$2\left(\frac{1}{2}x_2\right) = 2\left(\frac{7\pi}{4} - \sin^{-1}\left(\frac{1}{2}\right)\right)$$

$$x_2 = \frac{7\pi}{2} - 2\sin^{-1}\left(\frac{1}{2}\right)$$

$$\boxed{x_2 = \frac{7\pi}{2} - 2\sin^{-1}\left(\frac{1}{2}\right)}$$

9.948 radians

let  $w = \frac{1}{2}x - \frac{3\pi}{4}$

$$\textcircled{A} 5\sin w - 2 = \frac{1}{2} = \frac{1}{2}$$

$$\quad +2 \quad +2 \quad +\frac{1}{2}$$

$$\textcircled{B} 5\sin w = \frac{5}{2}$$

$$\frac{5\sin w}{5} = \frac{5}{2} \cdot \frac{1}{5}$$

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

$$\textcircled{C} \sin w = \frac{1}{2}$$

$$\textcircled{D} w_1 = \sin^{-1}\left(\frac{1}{2}\right)$$

$$\textcircled{E} w_2 = \pi - \sin^{-1}\left(\frac{1}{2}\right)$$

$$\textcircled{F} w_3 = -\pi - \sin^{-1}\left(\frac{1}{2}\right)$$

$$\textcircled{G} w_4 = -2\pi + \sin^{-1}\left(\frac{1}{2}\right)$$

Now we need to

put  $\frac{1}{2}x - \frac{3\pi}{4}$  back

in to find x

$$\textcircled{F} \frac{1}{2}x_3 - \frac{3\pi}{4} = -\pi - \sin^{-1}\left(\frac{1}{2}\right)$$

$$\frac{+3\pi}{4} \quad +3\pi/4$$

$$\frac{1}{2}x_3 = -\frac{\pi}{4} - \sin^{-1}\left(\frac{1}{2}\right)$$

$$2\left(\frac{1}{2}x_3\right) = 2\left(-\frac{\pi}{4} - \sin^{-1}\left(\frac{1}{2}\right)\right)$$

$$x_3 = -\frac{\pi}{2} - 2\sin^{-1}\left(\frac{1}{2}\right)$$

$$\boxed{x_3 = -\frac{\pi}{2} - 2\sin^{-1}\left(\frac{1}{2}\right)}$$

$$x_3 \approx -2.618$$

