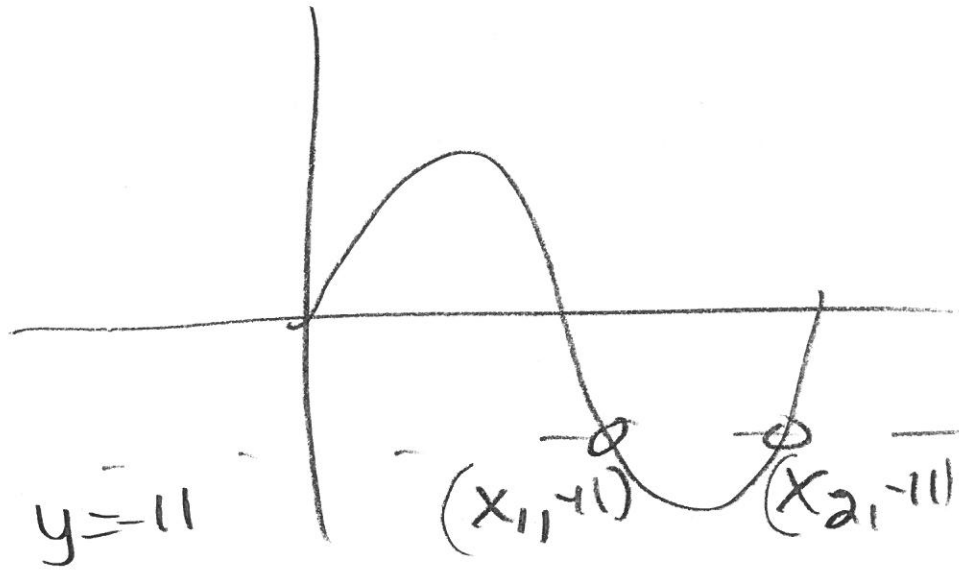


$$y = 16 \sin\left(\frac{2\pi}{20} x\right)$$



window

$x_{min} = 0$

$x_{max} = 20$

$y_{min} = -20$

$y_{max} = 20$

$$x_1 \approx 12.413$$

$$x_2 \approx 17.587$$

So

① $PL = 20$

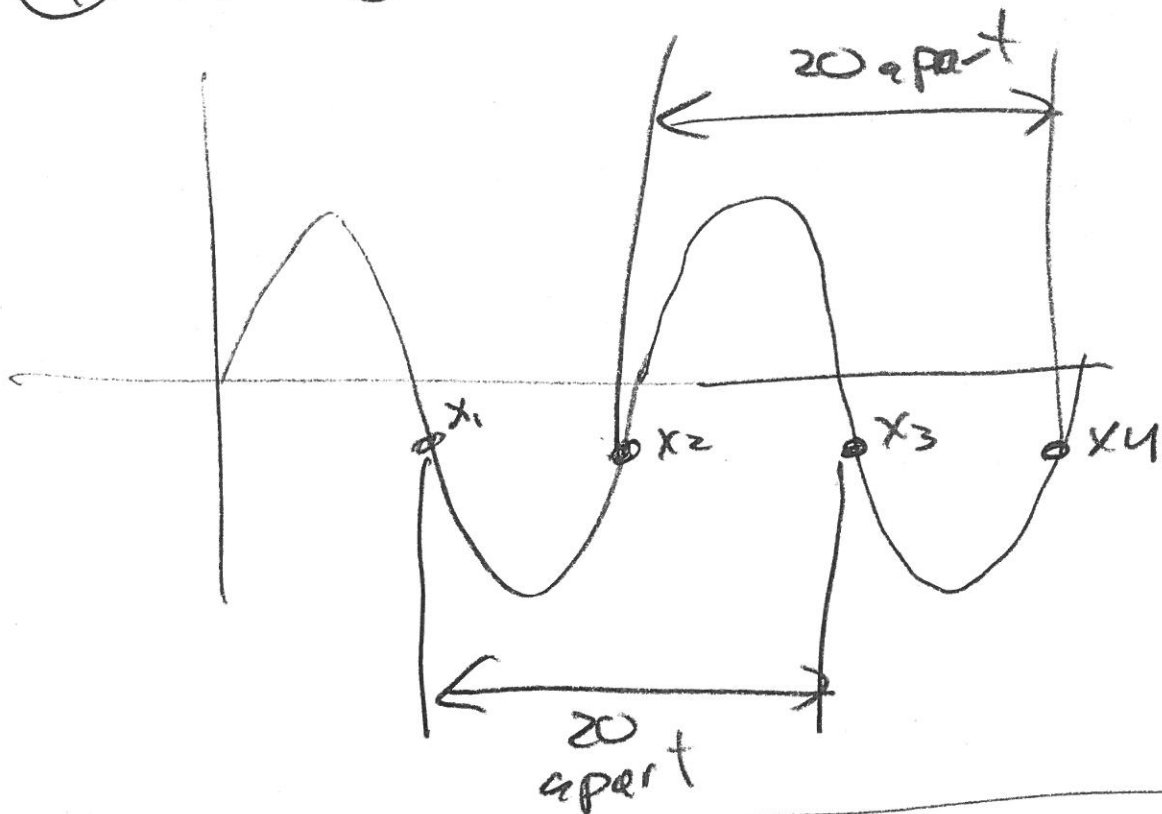
② $e_{amp} = 16$

③ 2 solutions

12.413

17.587

④ All solutions



$$x_1 = 12.413$$

$$x_2 = 17.587$$

$$x_3 = 12.413 + 20 \\ = 32.413$$

$$x_4 = 17.587 + 20 \\ = 37.587$$

next two + solutions

all
④

$X \in \left\{ \begin{array}{l} 12.413 + 20n \\ 17.587 + 20n \end{array} \right.$

$$12.413 + 20n$$

$$17.587 + 20n$$

← PL

↑ PL

$$n \in \mathbb{Z}$$

n is any integer

EXACT SOLUTIONS

$$X_1 \Rightarrow -11 = 16 \sin\left(\frac{2\pi}{20} x\right)$$

$$\frac{-11}{16} = \frac{16 \sin\left(\frac{2\pi}{20} x\right)}{16}$$

$$\frac{-11}{16} = \sin\left(\frac{2\pi}{20} x\right)$$

$$\frac{2\pi}{20} x = \sin^{-1}\left(\frac{-11}{16}\right)$$

$$x = \frac{20}{2\pi} \sin^{-1}\left(\frac{-11}{16}\right)$$

→ negative solution

$$x = -2.413$$

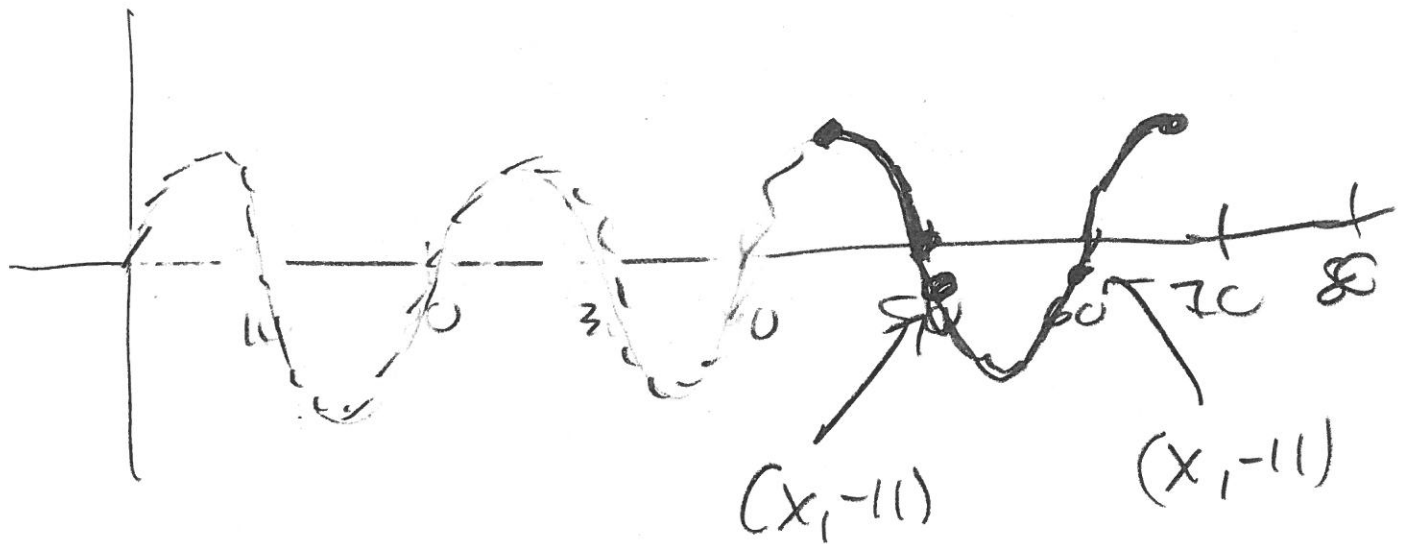
$x + PL = +$ version

$$x_2 = -2.413 + 20 = 17.587$$

$$x_1 = 10 + \frac{20}{\pi} \sin^{-1}\left(\frac{11}{16}\right) = 12.413$$

← positive

⑤ Solutions are $x \in [45, 65]$



without graphing calculator

$$\text{Rule} = x = 12.413 + 20n$$

$$\text{min } x = 45$$

$$45 = 12.413 + 20n$$

$$45 - 12.413 = 20n$$

$$45 - 12.413 = 20n$$

$$\frac{45 - 12.413}{20} = \frac{20n}{20}$$

$$n = 1.6 \rightarrow \text{round up to } 2$$

$$x = 12.413 + 20(2) = 12.413 + 40 = 52.413$$

⑤ cont

$$\max X = 65$$

$$65 = 17.587 + 20n$$

$$65 - 17.587 = 20n$$

$$\frac{65 - 17.587}{20} = \frac{20n}{20}$$

$$n = \frac{65 - 17.587}{20} = 2.37$$

round down

$$n = 2$$

$$\begin{aligned} \max X &= 17.587 + 20(2) \\ &= 17.587 + 40 \end{aligned}$$

$$X = 57.587$$

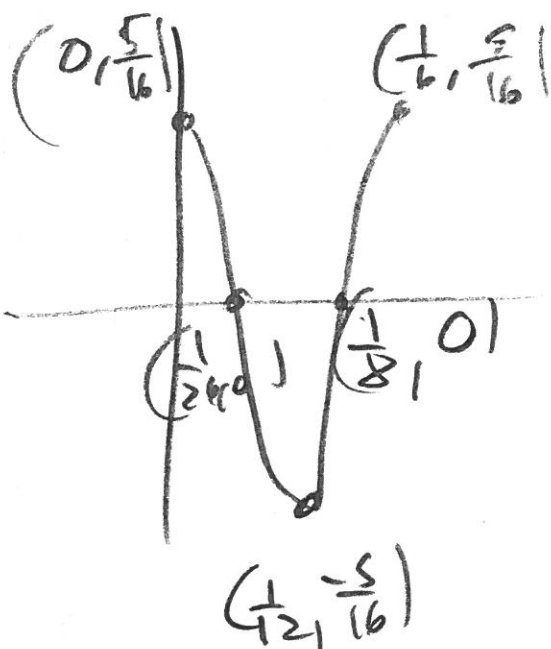
2 solutions over $[45, 65]$

$$\begin{aligned} X &= 52.413 \\ \text{or} \\ X &= 57.587 \end{aligned}$$

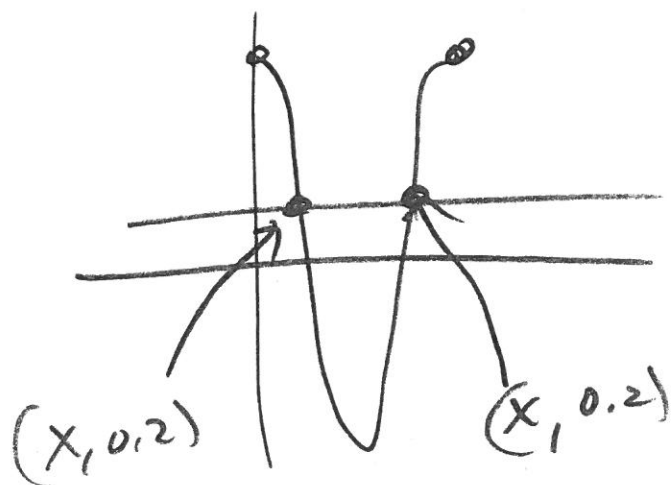
Given model $f(x) = \frac{5}{16} \cos(12\pi x)$

$$b = 12\pi$$

$$\textcircled{1} \quad PL = \frac{2\pi}{b} = \frac{2\pi}{12\pi} = \frac{1}{6}$$



$$\textcircled{2} \quad \text{amplitude} = \frac{5}{16}$$



exact

$$0.2 = \frac{5}{16} \cos(12\pi x)$$

$$(0.2) \frac{16}{5} = \cos(12\pi x)$$

$$\frac{3.2}{5} = \cos 12\pi x$$

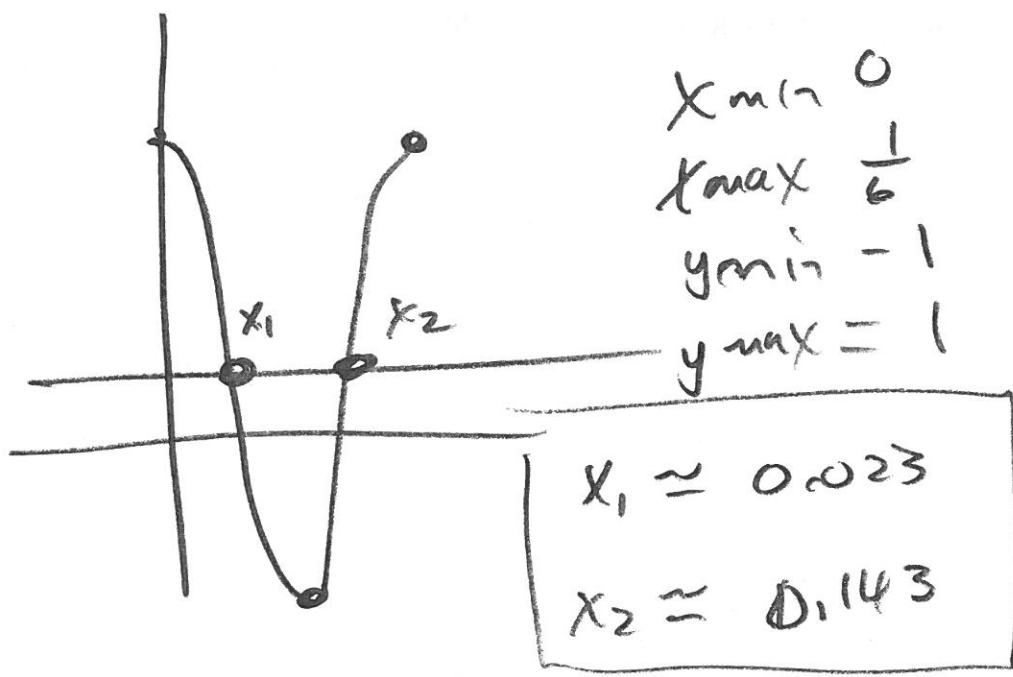
$$12\pi x = \cos^{-1}\left(\frac{3.2}{5}\right)$$

$$x = \frac{1}{12\pi} \cos^{-1}\left(\frac{3.2}{5}\right)$$

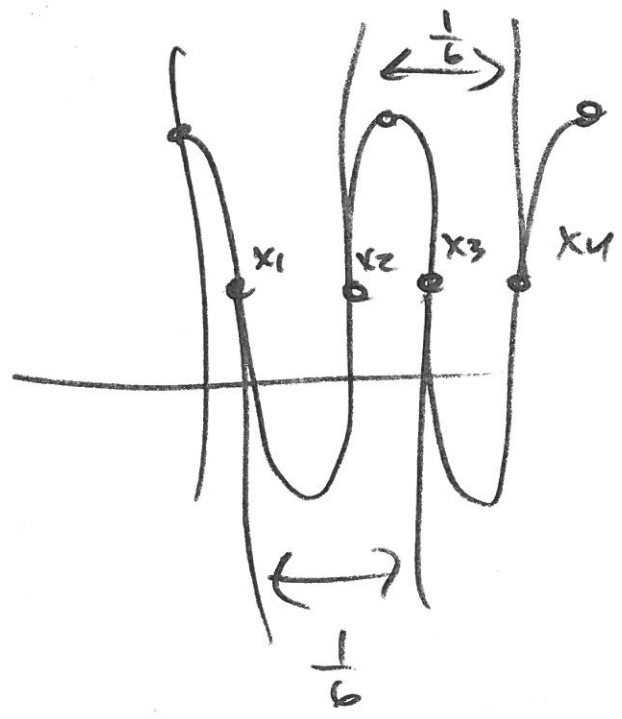
$$x_1 \approx 0.023$$

2nd solution

$$\frac{1}{6} - 0.023 \approx 0.143$$



All solutions

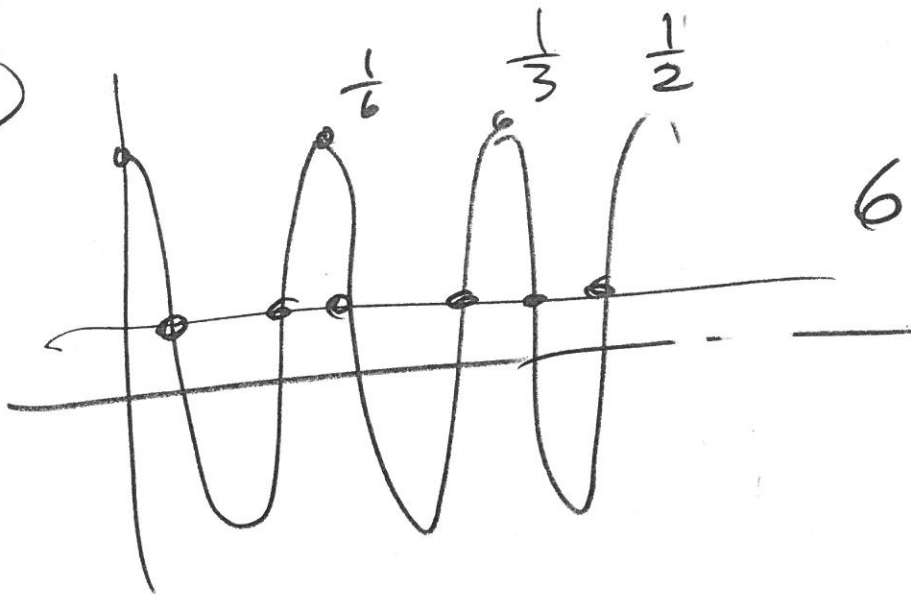


So
All solutions $\in \mathbb{R}$

$$x \in \left\{ \begin{array}{l} 0.023 + \frac{1}{6}n \\ 0.143 + \frac{1}{6}n \end{array} \right. \in \mathbb{R}$$

$n \in \mathbb{Z}$
 n is an integer

(#5)



6 solutions

$$x \begin{cases} 0.023 + \frac{1}{6}n \\ 0.143 + \frac{1}{6}n \end{cases} \quad n \in \mathbb{Z}$$

$$n = 0, 1, 2$$

$$\begin{array}{l} x_1 = 0.023 \\ x_2 = 0.143 \\ \frac{1}{6} \left\{ \begin{array}{l} x_3 = 0.190 \\ x_4 = 0.310 \\ x_5 = 0.356 \\ x_6 = 0.476 \end{array} \right. \end{array} \left. \begin{array}{l} + \frac{1}{6} \\ + \frac{1}{6} \end{array} \right\} \begin{array}{l} \in \mathbb{R} \\ x = \end{array} \left\{ \begin{array}{ll} 0.023, & 0.143 \\ 0.190 & 0.310 \\ 0.356 & 0.476 \end{array} \right\}$$

for $x \in [0, \frac{1}{2}]$