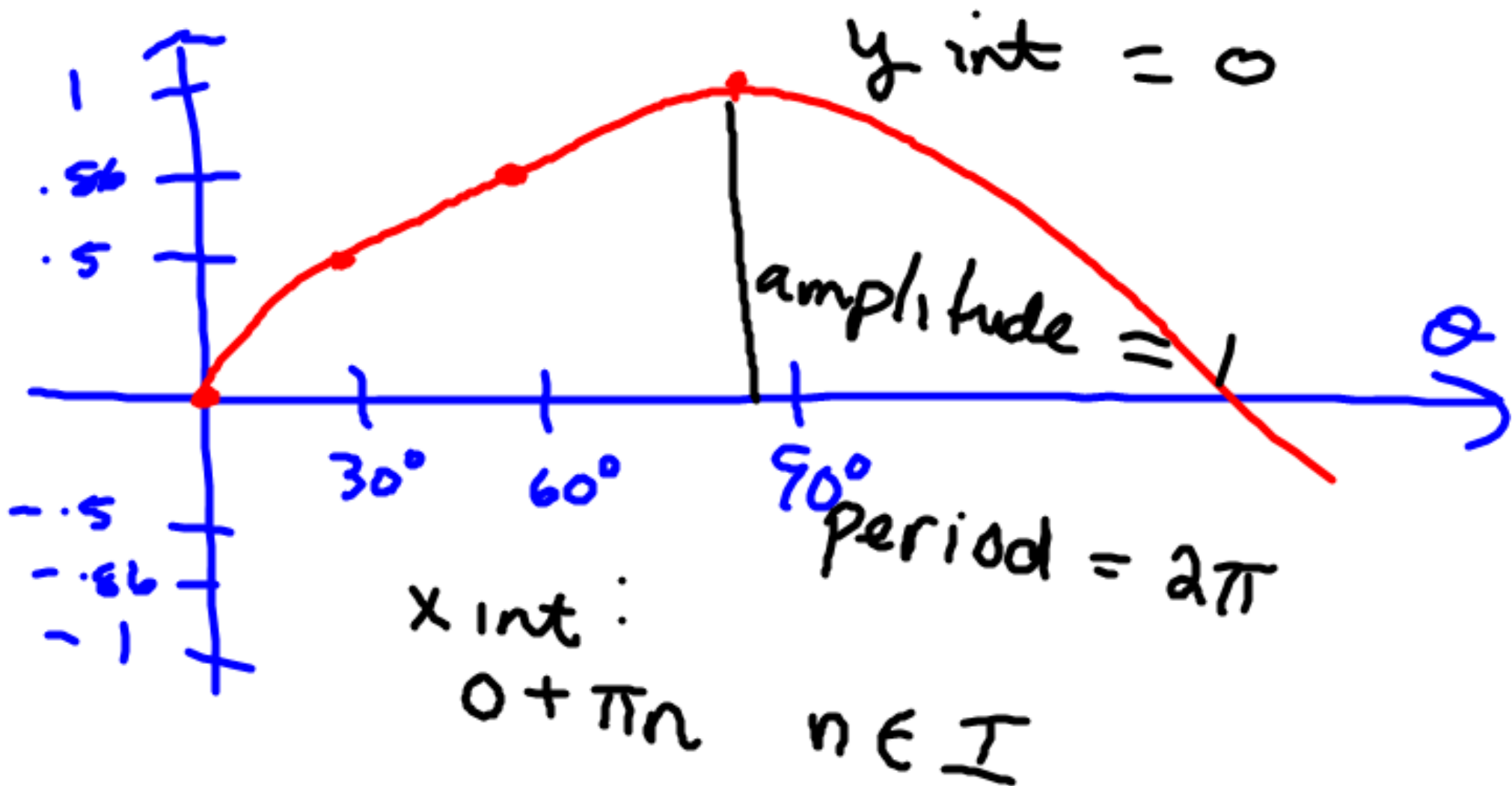
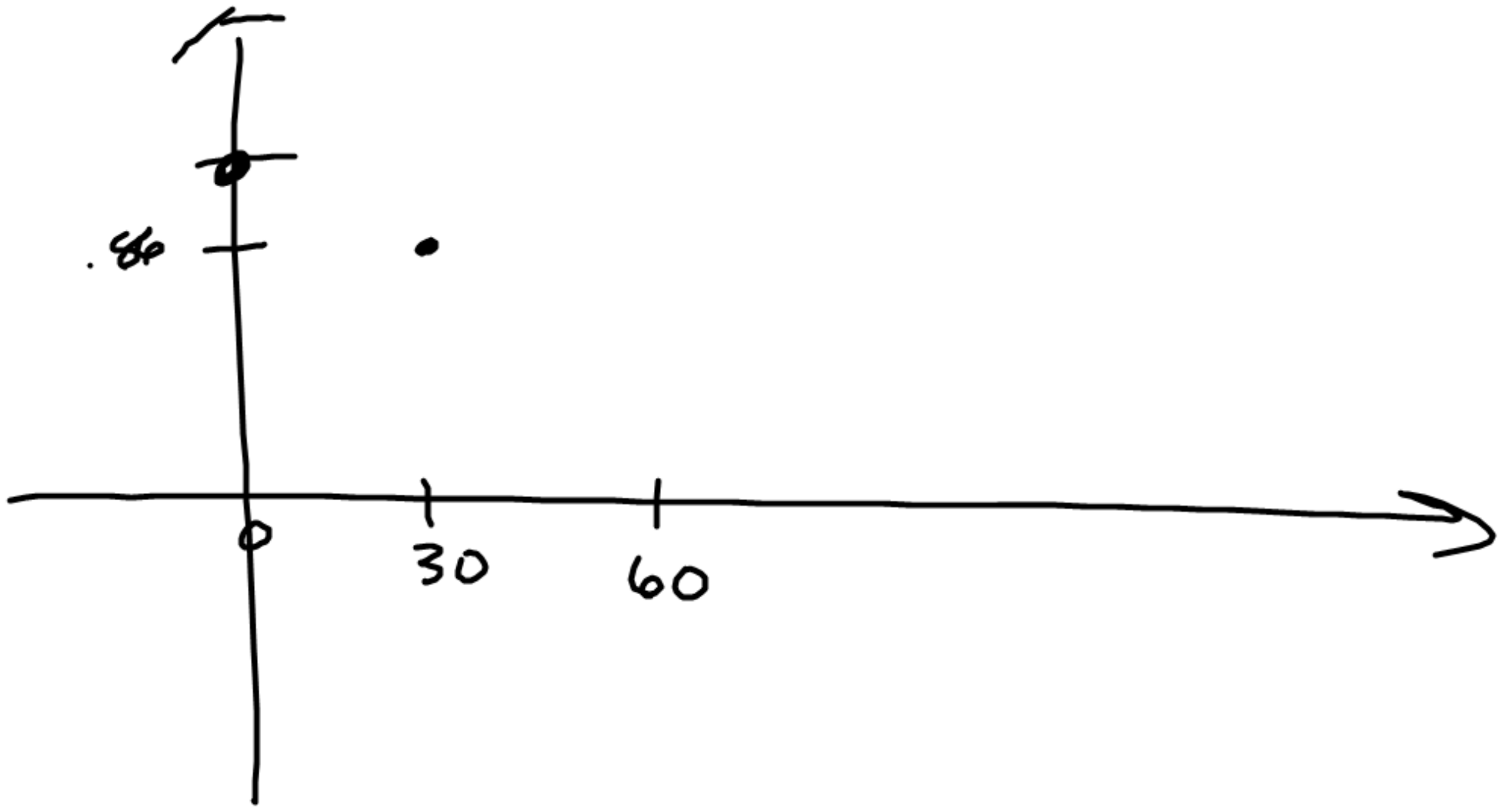


Chapter 5 Trigonometric Functions and Graphs

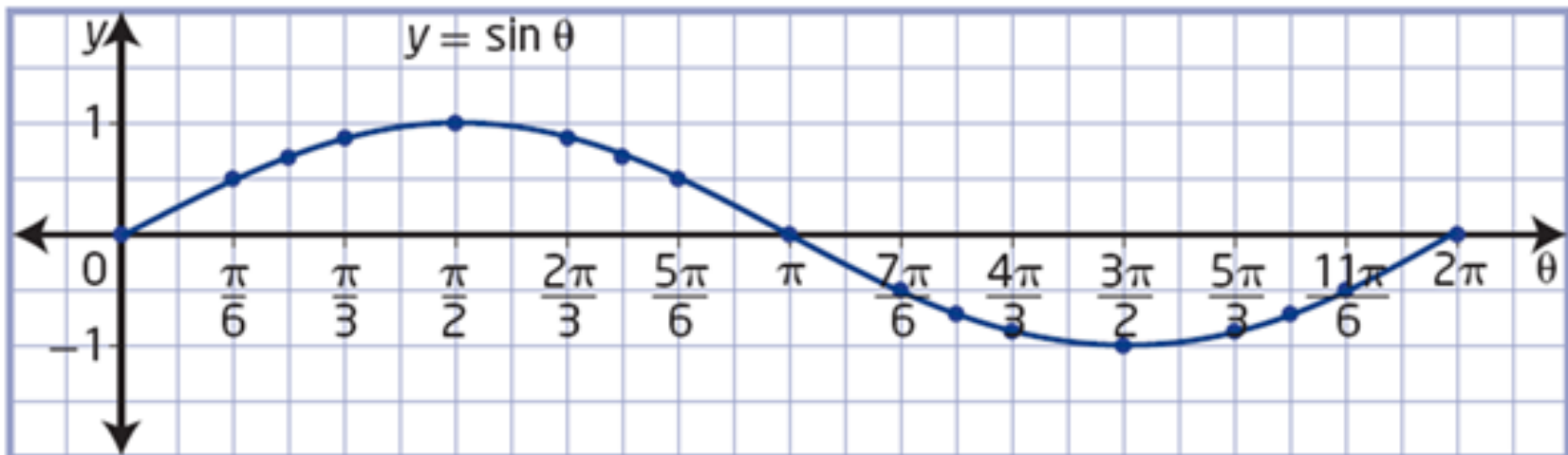
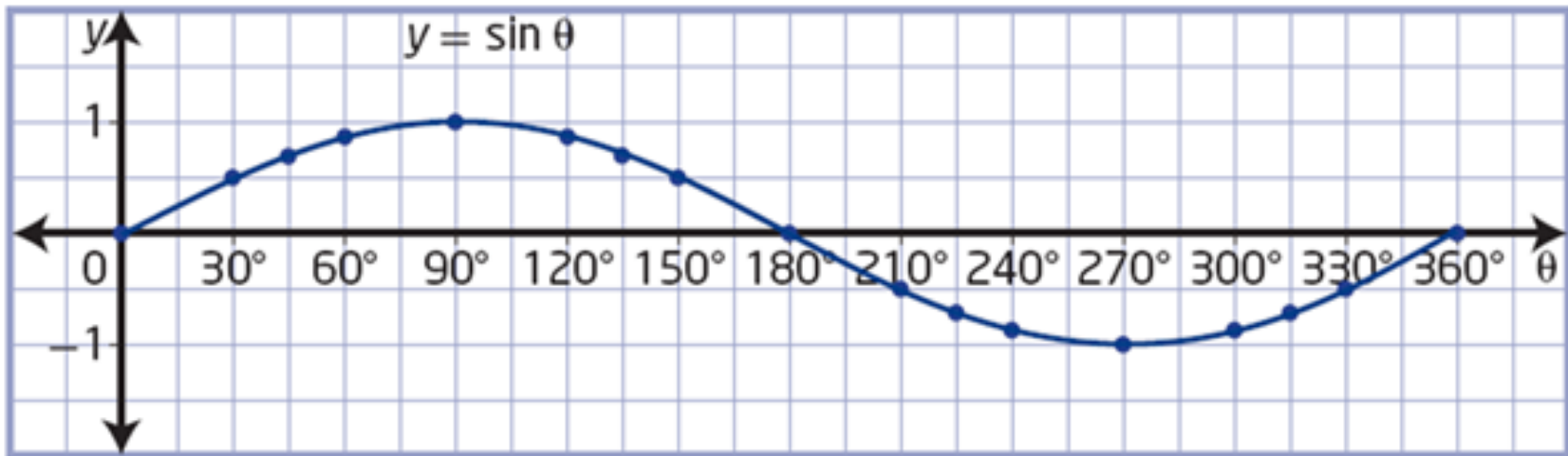
5.1 Graphing Sine and Cosine Functions

Introduction Activity Using Unit Circle.





The graph of $y = \sin \theta$ should have looked like the following:



- The curve is periodic.
- The curve is continuous.
- The domain is $\{\theta \mid \theta \in \mathbb{R}\}$.
- The range is $\{y \mid -1 \leq y \leq 1, y \in \mathbb{R}\}$.
- The maximum value is $+1$.
- The minimum value is -1 .
- The **amplitude** of the curve is 1 .
- The period is 360° or 2π .
- The y -intercept is 0 .
- In degrees, the θ -intercepts are
 $\dots, -540^\circ, -360^\circ, -180^\circ, 0^\circ, 180^\circ, 360^\circ, \dots$, or $180^\circ n$,
where $n \in \mathbb{I}$.
The θ -intercepts, in radians, are
 $\dots, -3\pi, -2\pi, -\pi, 0, \pi, 2\pi, \dots$, or $n\pi$,
where $n \in \mathbb{I}$.

Which points would you determine to be the key points for sketching a graph of the sine function?

Your Turn

Sketch the graph of $y = \cos \theta$ for $0^\circ \leq \theta \leq 360^\circ$. Describe its characteristics.

The characteristics for the cosine graph are very similar to the characteristics for the sine graph except for what features?

Graphs of the form $y = A \sin B\theta$

Ex. 1 Graph the following for one period:

$$y = 2 \sin 3\theta$$

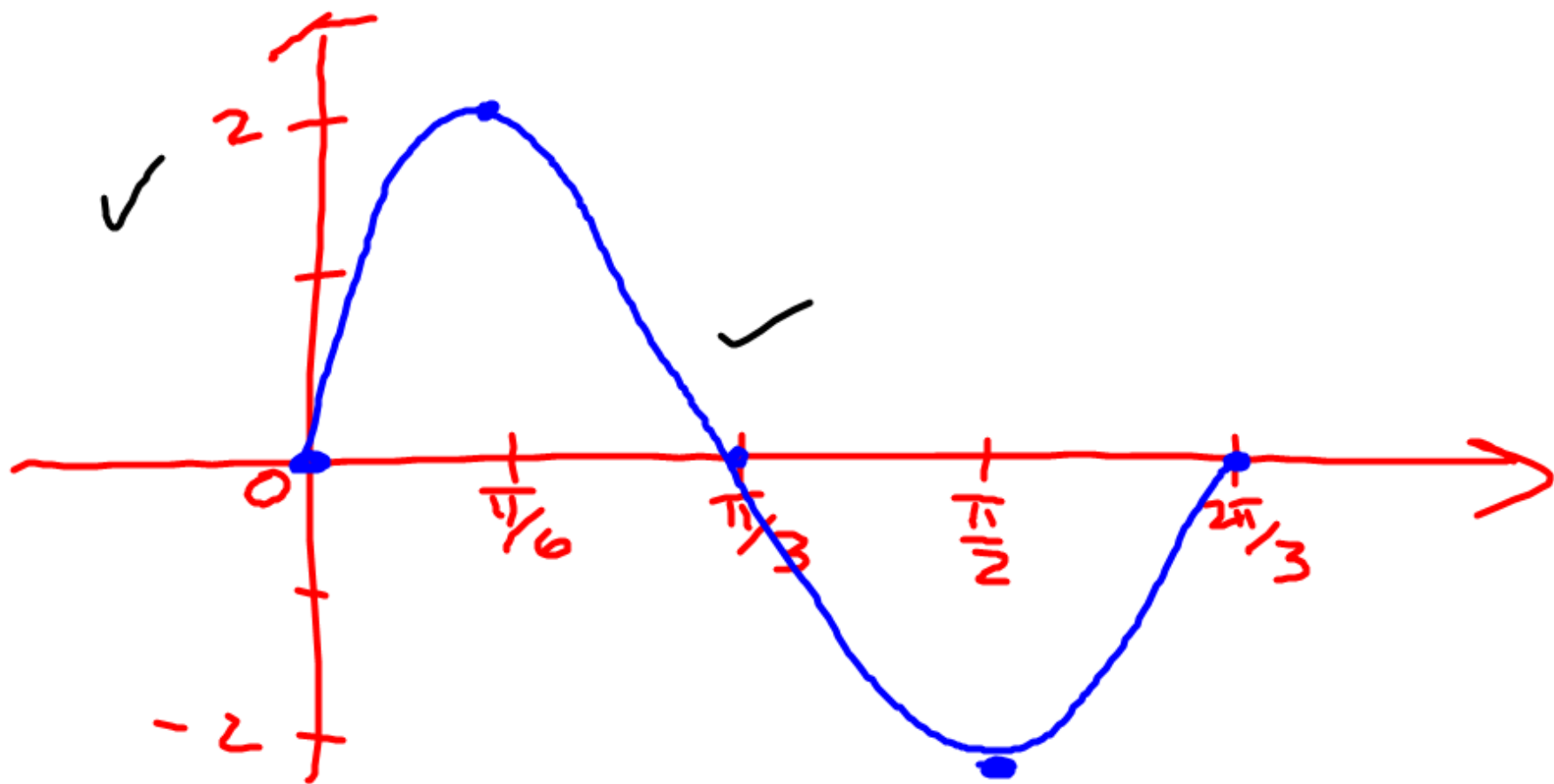
$$\begin{aligned} \text{amp} &= |A| \\ &= 2 \end{aligned}$$

$$\text{Per} : \frac{2\pi}{B} = \frac{2\pi}{3}$$

$$\text{Per} \cdot \frac{1}{4} = \frac{2\pi}{3} \cdot \frac{1}{4} = \frac{\pi}{6}$$

critical #'s

$$0, \frac{\pi}{6}, \frac{2\pi}{6}, \frac{3\pi}{6}, \frac{4\pi}{6}$$



Ex. 2 Graph the following for one period:

$$y = -3 \cos 2x$$

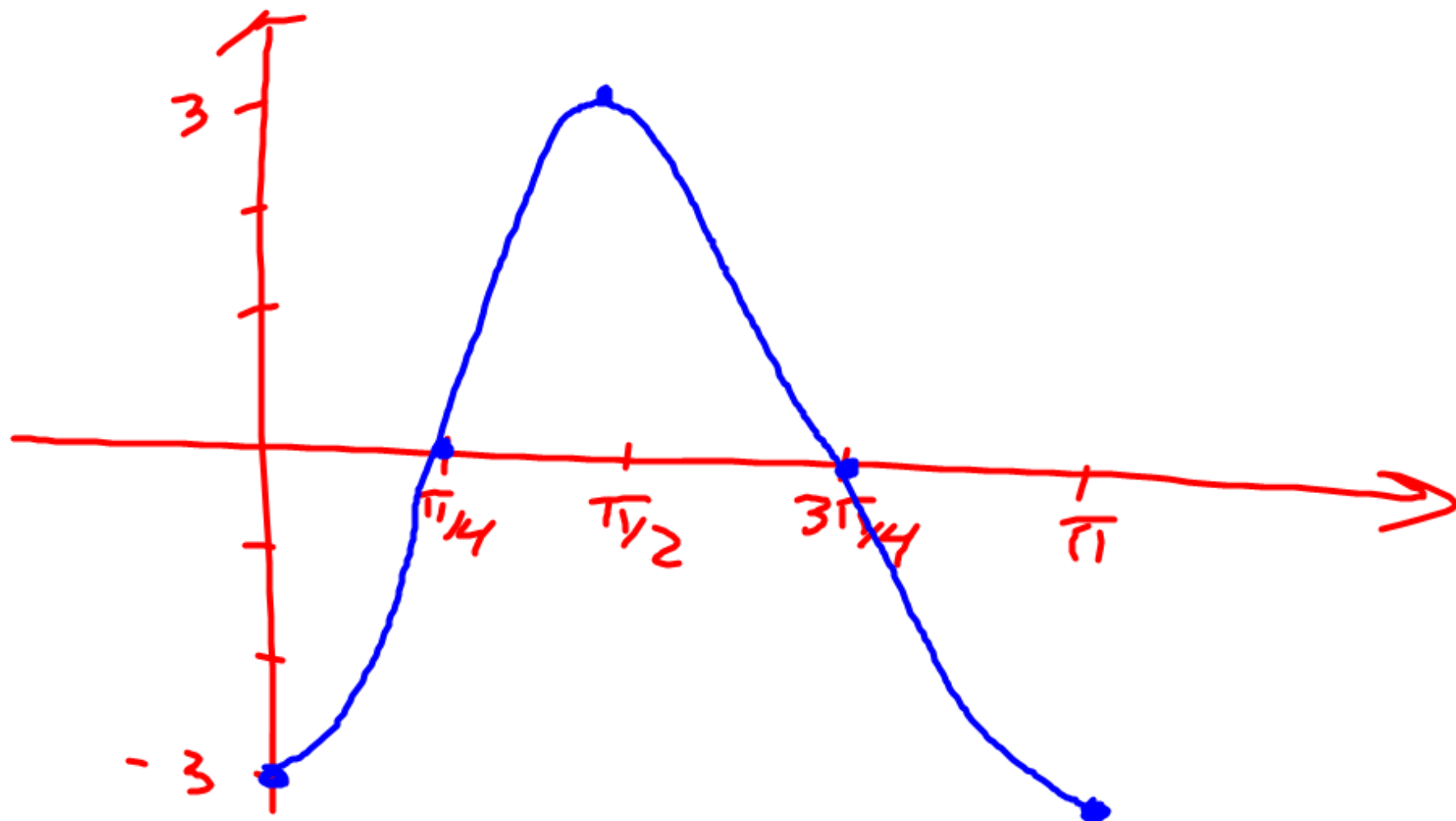
$$\text{amp: } |-3| = 3$$

$$\text{per: } \frac{2\pi}{2} = \pi$$

critical #s

$$\pi \cdot \frac{1}{4} = \frac{\pi}{4}$$

$$0, \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \frac{4\pi}{4}$$



Ex. 3 Graph the following for one period:

$$y = 3 \cos 4x$$

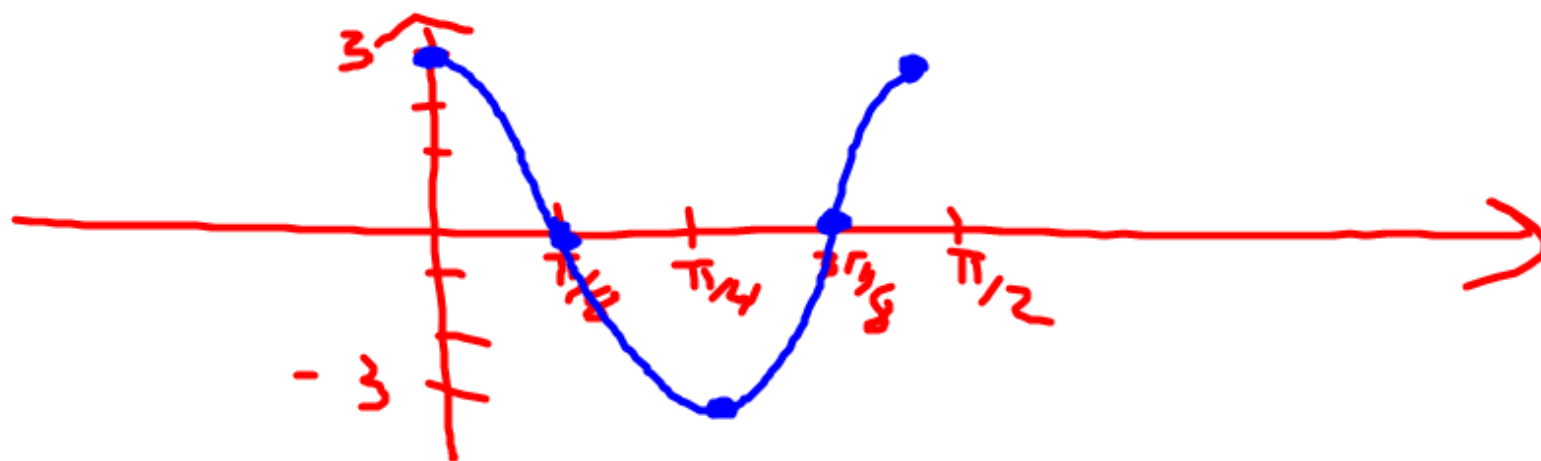
$$\text{amp} = 3$$

$$\text{per} = \frac{2\pi}{4} = \frac{\pi}{2}$$

$$\frac{\pi}{2} \cdot \frac{1}{4} = \frac{\pi}{8}$$

critical #'s

$$0, \frac{\pi}{8}, \frac{2\pi}{8}, \frac{3\pi}{8}, \frac{4\pi}{8}$$



Assignment:

Page 233 #'s 6, 7, 8, 9

also Handout

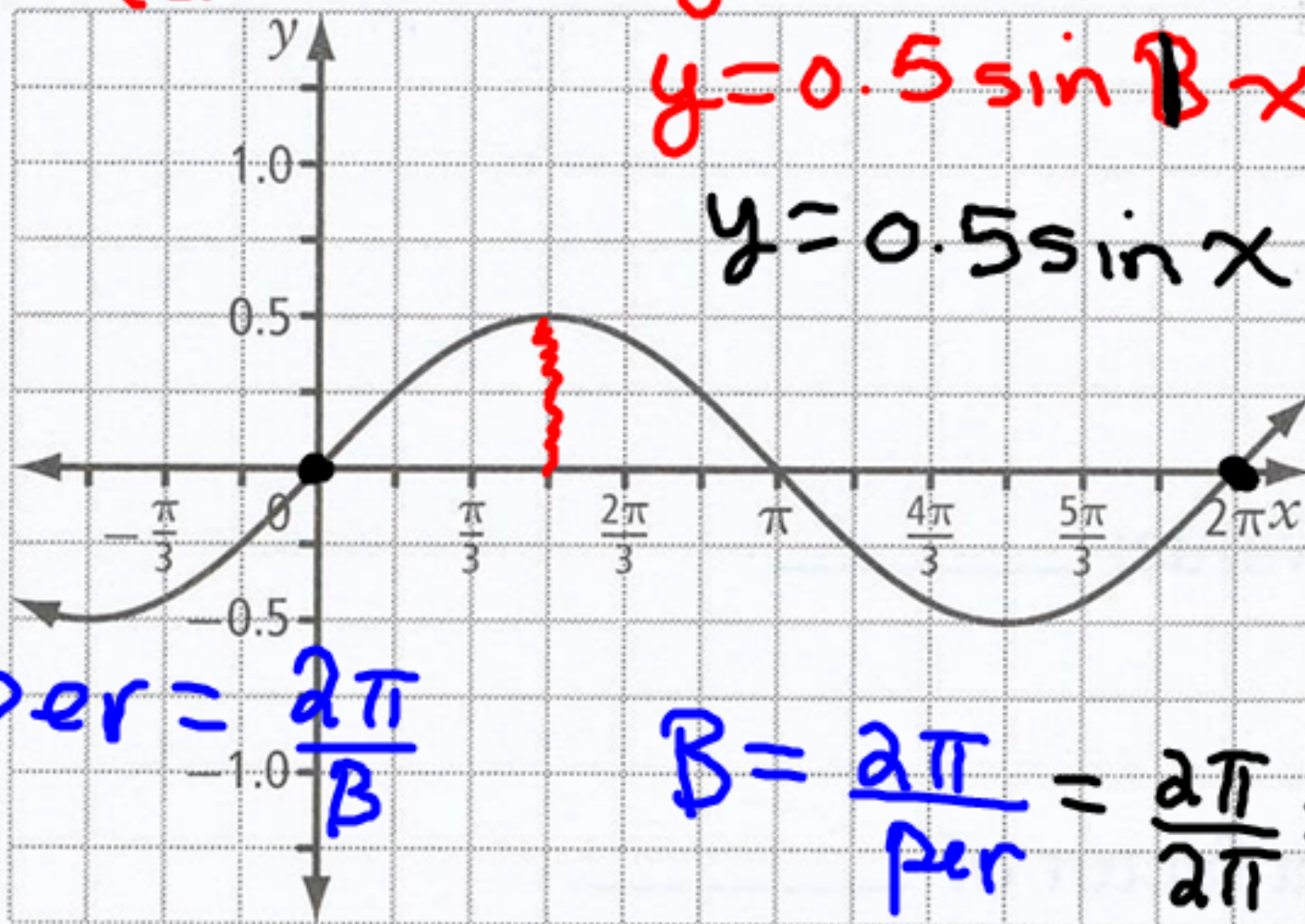
Example: Determine the equation of the function whose graph is shown.

$$y = A \sin Bx$$

cos

$$y = A \sin Bx$$
$$y = 0.5 \sin Bx$$
$$y = 0.5 \sin x$$

a)



$$\text{per} = \frac{2\pi}{B}$$

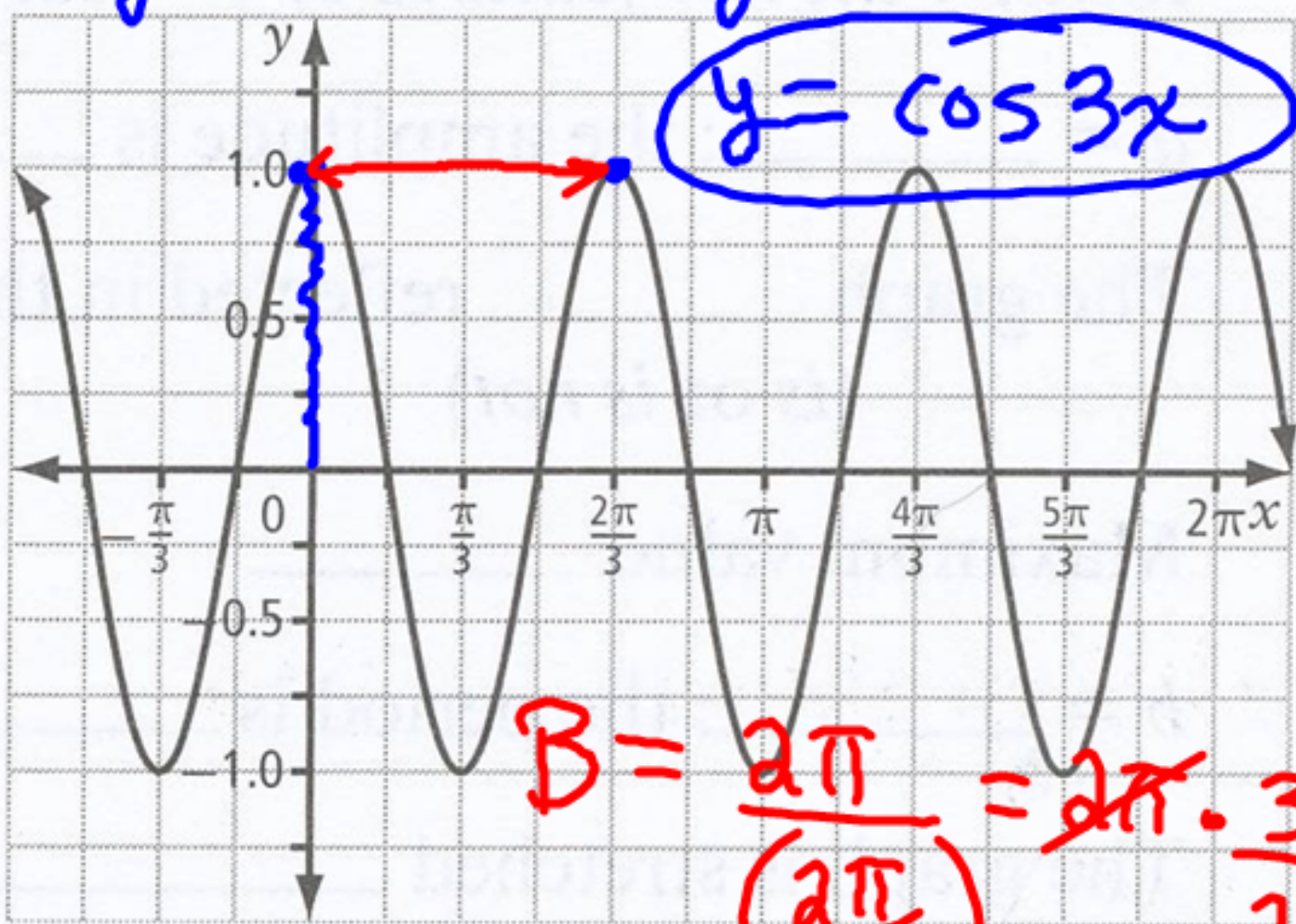
$$B = \frac{2\pi}{\text{per}} = \frac{2\pi}{2\pi} = 1$$

$$y = A \cos Bx$$

$$y = 1 \cos Bx$$

$$y = \cos 3x$$

b)



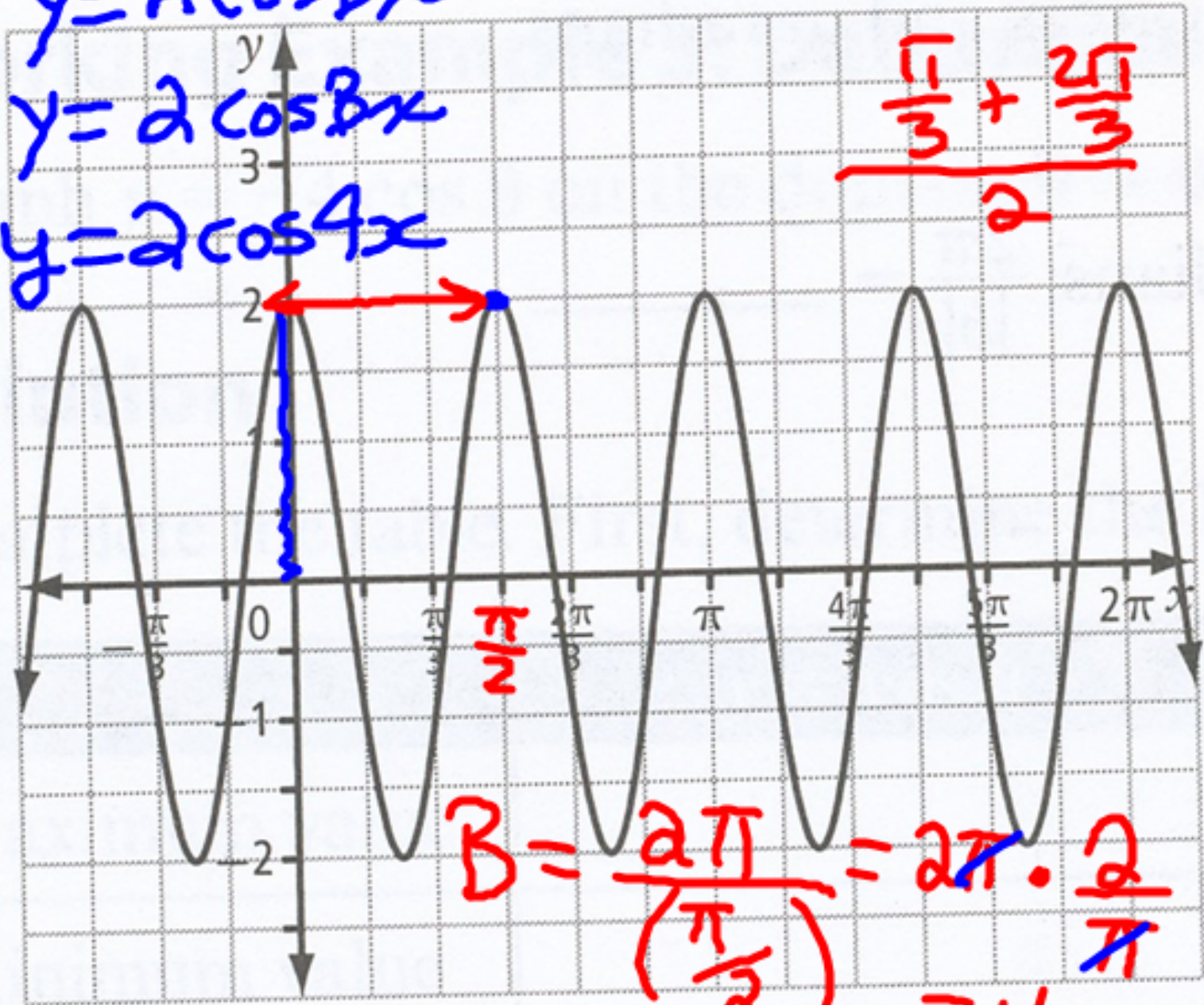
$$B = \frac{2\pi}{\left(\frac{2\pi}{3}\right)} = \frac{2\pi \cdot 3}{2\pi}$$

c)

$$y = A \cos Bx$$

$$y = 2 \cos Bx$$

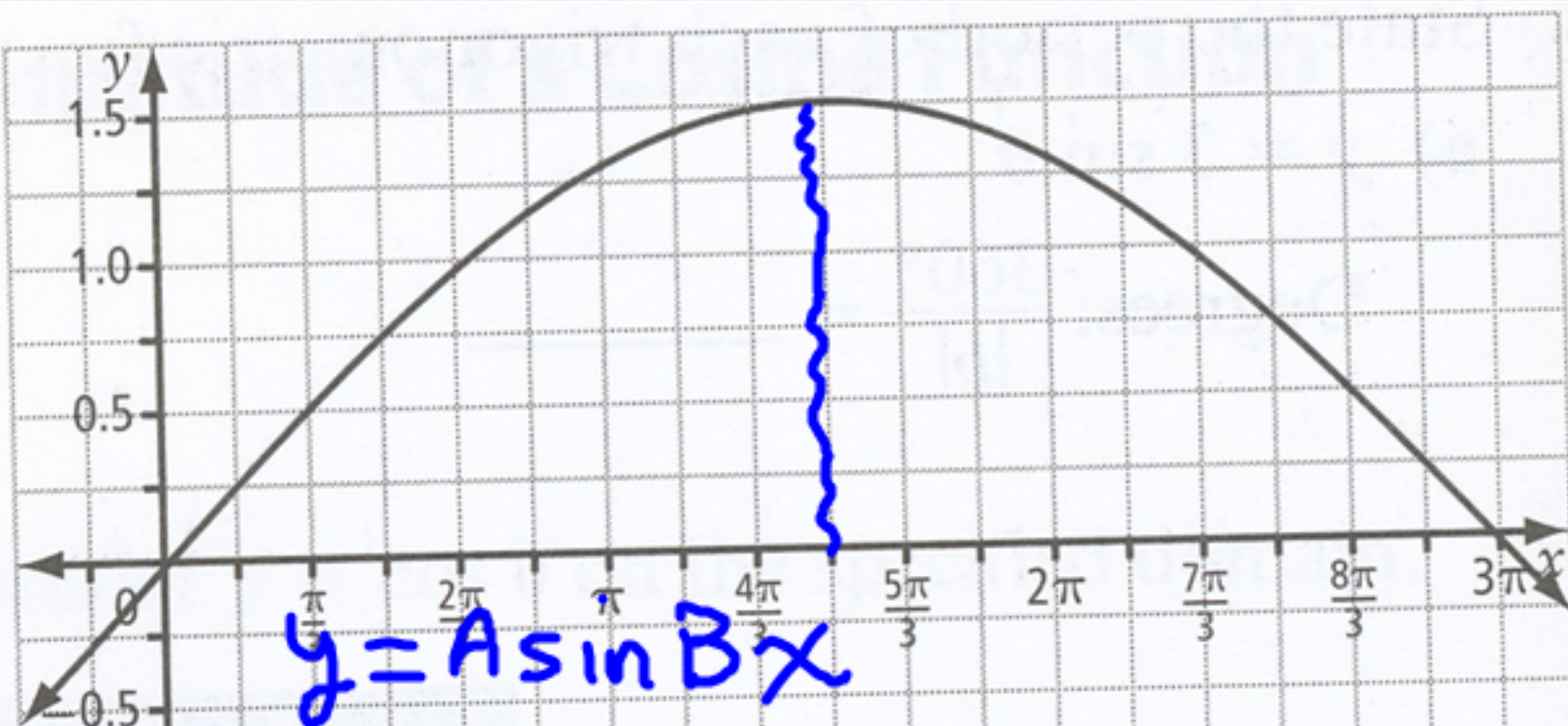
$$y = 2 \cos 4x$$



$$\frac{\frac{\sqrt{11}}{3} + \frac{2\sqrt{11}}{3}}{2}$$

$$B = \frac{2\pi}{(\frac{\pi}{2})} = 2\pi \cdot \frac{2}{\pi} = 4$$

d)



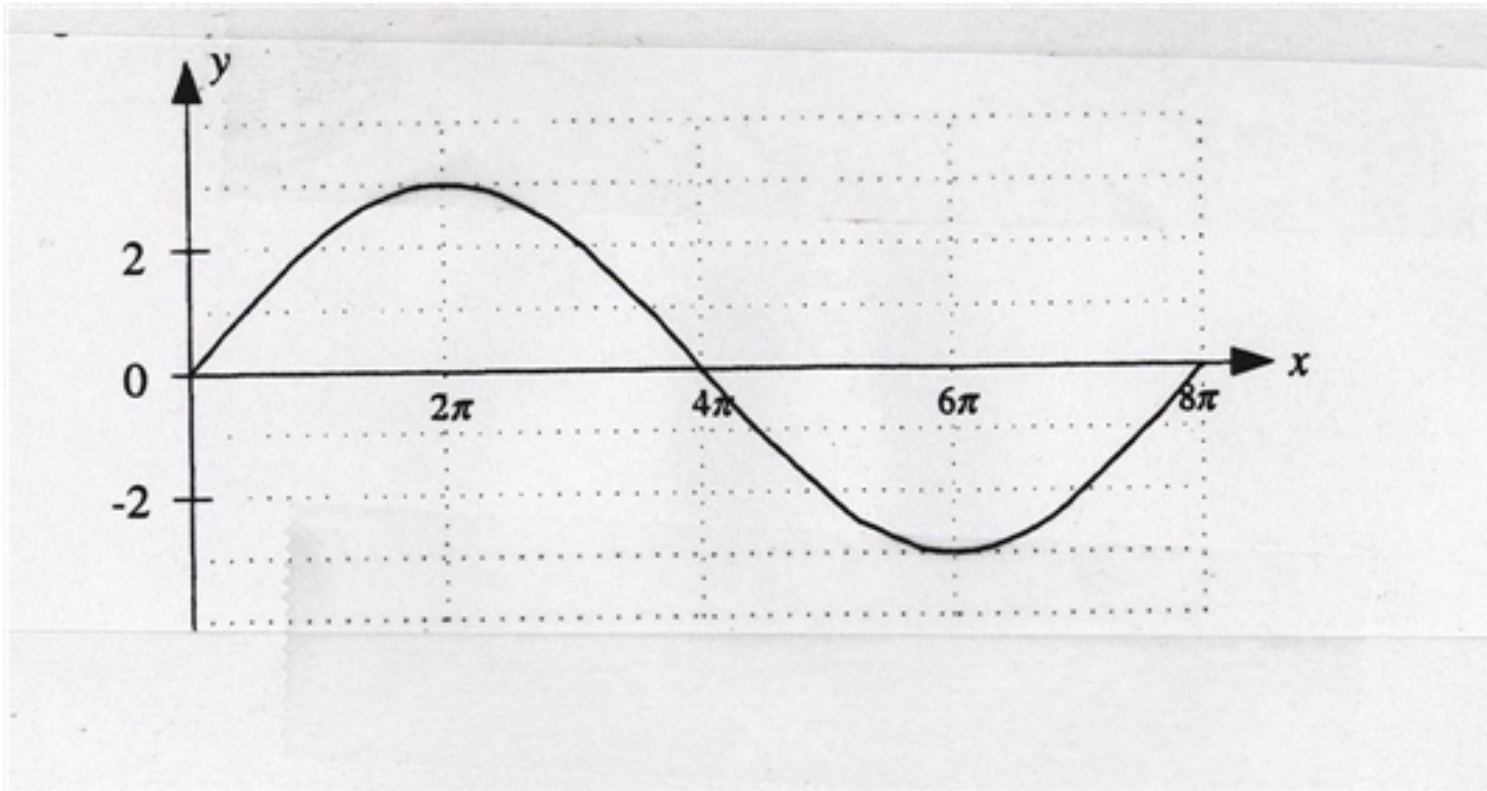
$$y = A \sin Bx$$

$$y = 1.5 \sin Bx$$

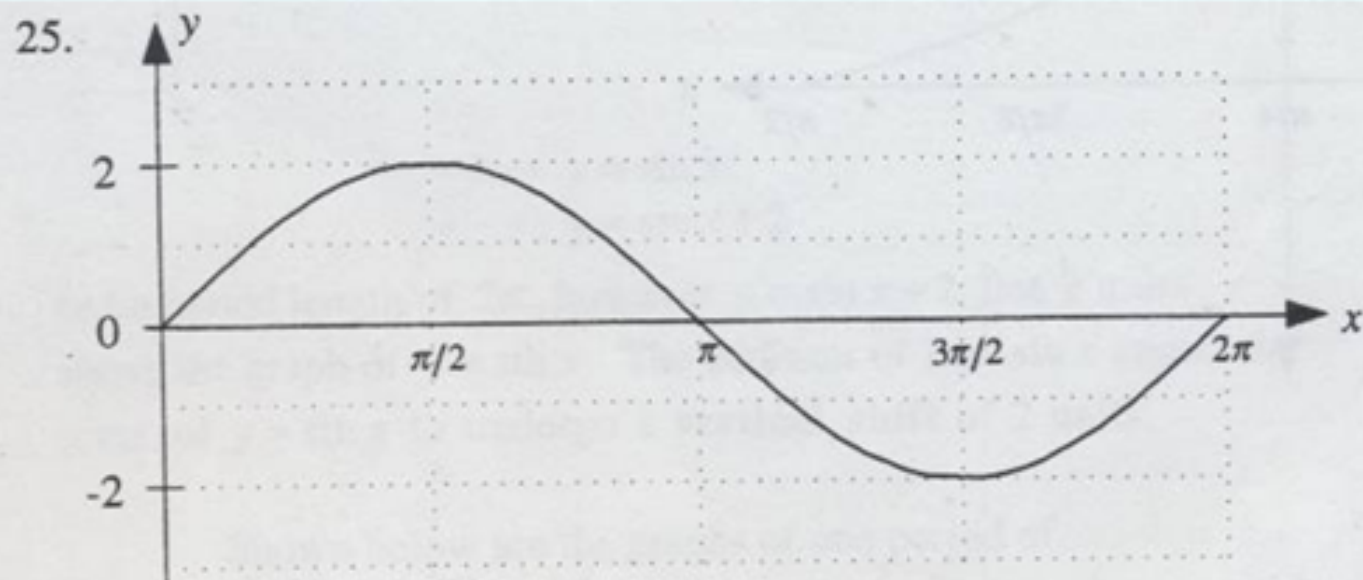
$$B = \frac{2\pi}{6\pi} = \frac{1}{3}$$

$$y = 1.5 \sin \frac{1}{3}x$$

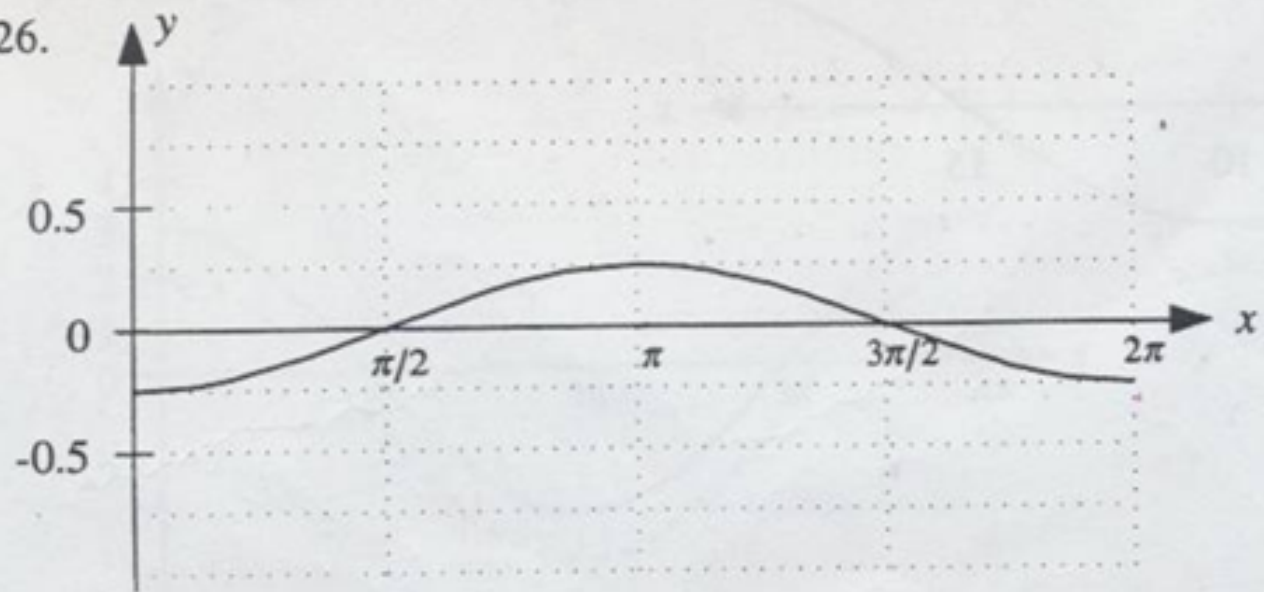
Your Turn: Determine the equation of the function whose graph is shown.



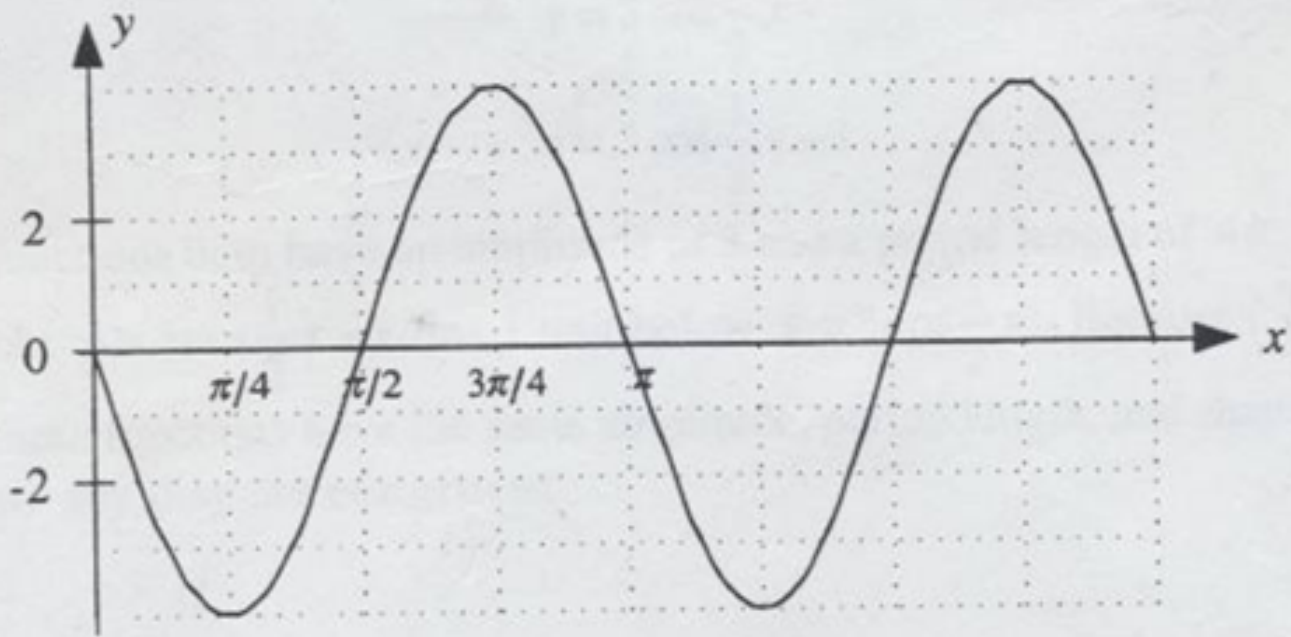
Extra Practice



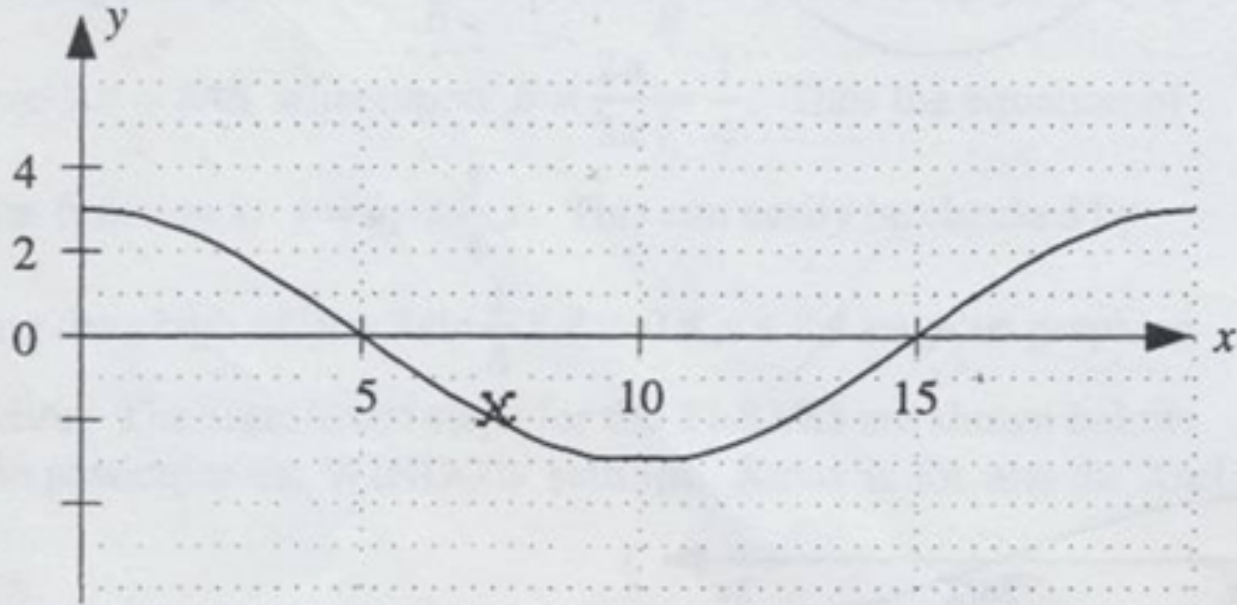
26.

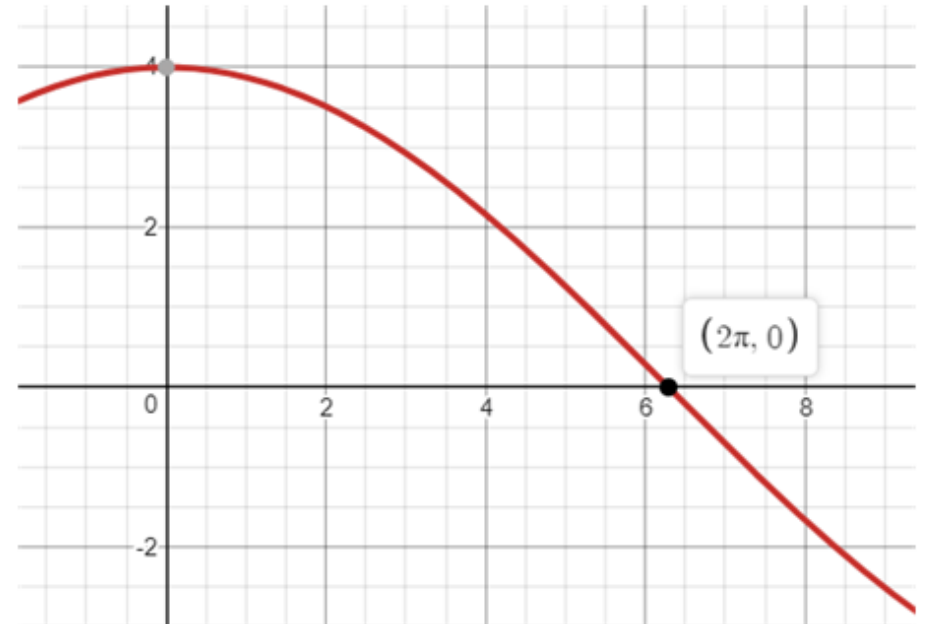
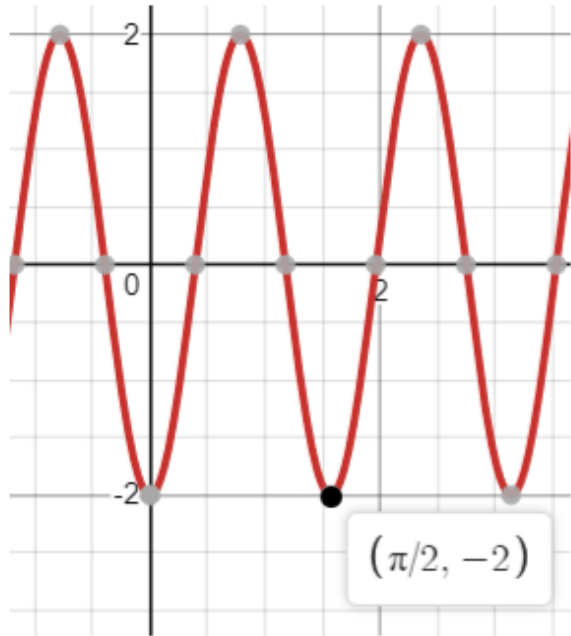


27.



30.





Assignment Page 234 #'s 10, 14