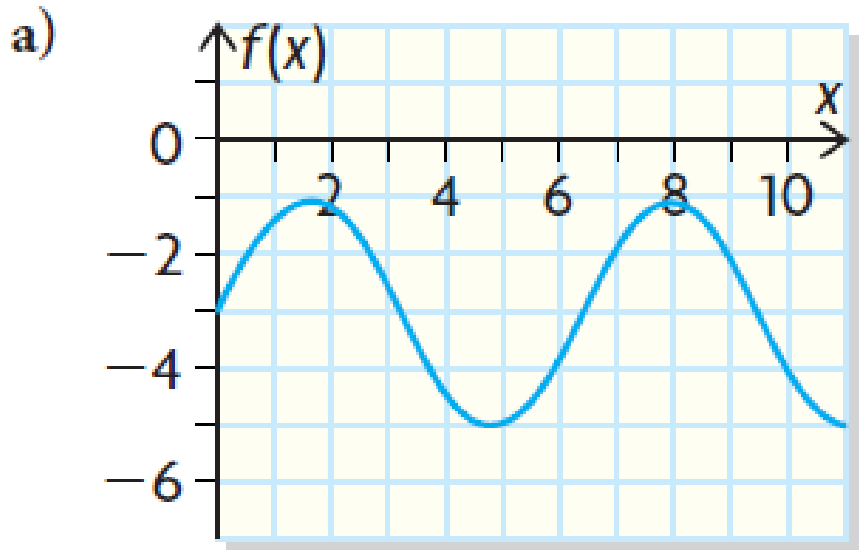


6.2 – Investigating the Properties of Sinusoidal Functions

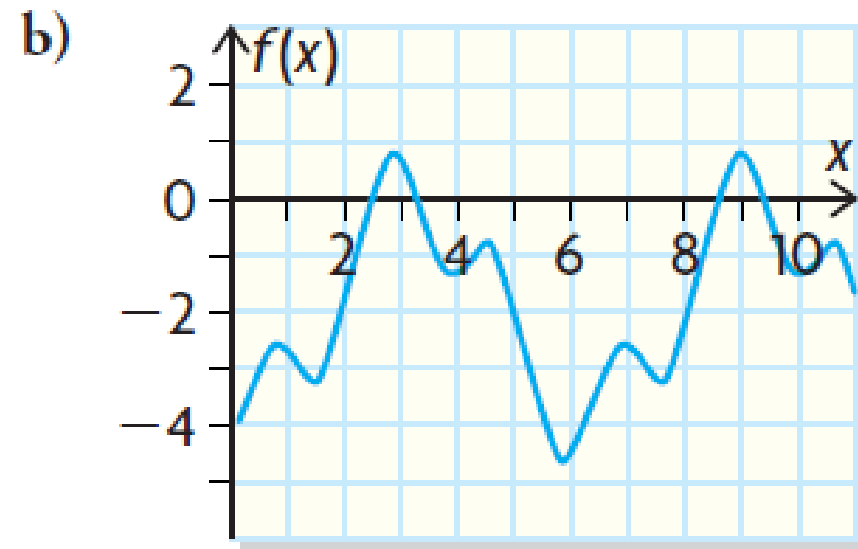
- **GOAL:** Examine the functions that are associated with all sinusoidal functions.

EXAMPLE 1

Determine whether the graph represents a periodic function. If it does, determine whether it represents a sinusoidal function.



Periodic AND Sinusoidal

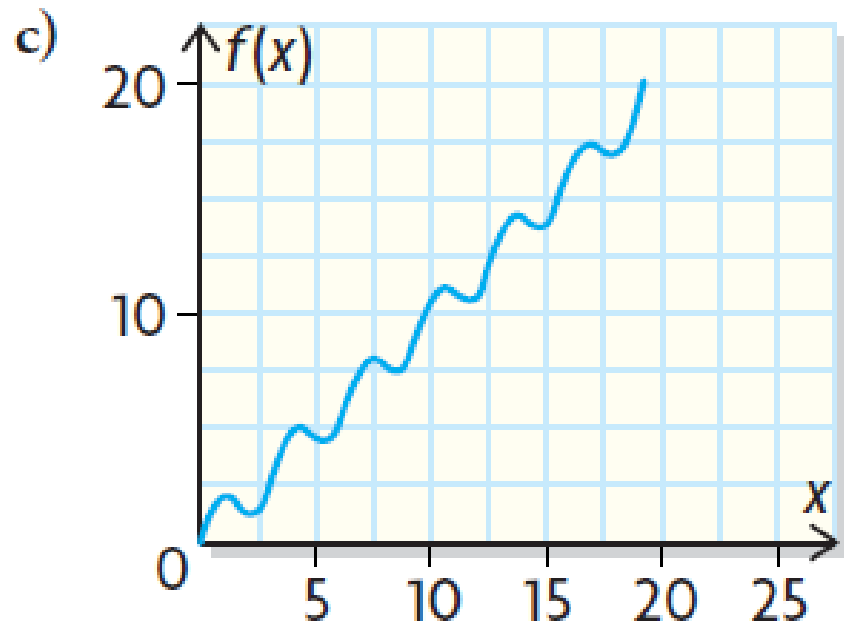


Periodic – pattern repeats but waves are *not* symmetrical

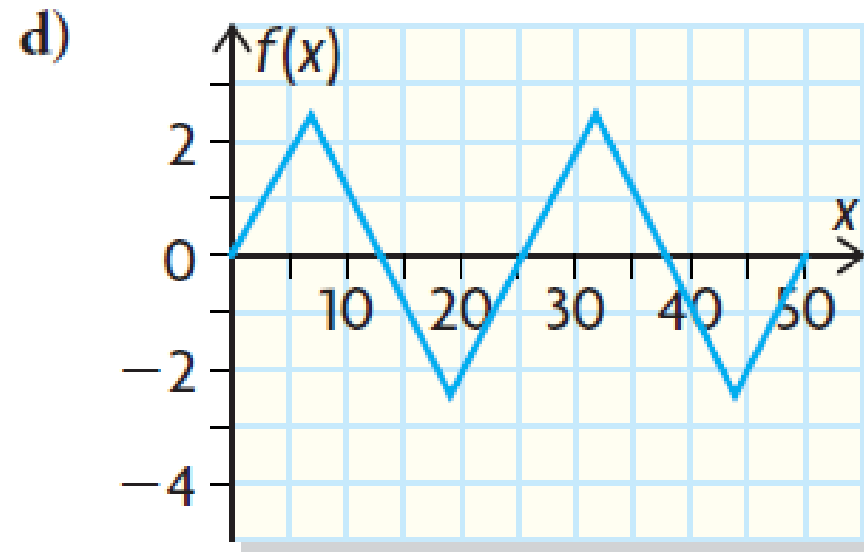
Ex. #1 cont'd...

EXAMPLE 1

Determine whether the graph represents a periodic function. If it does, determine whether it represents a sinusoidal function.



**NEITHER Periodic NOR
Sinusoidal**



**Periodic – not sinusoidal since
waves are *not smooth***

Example #2

- Determine the coordinates of the point $P(x, y)$ resulting from a rotation of 70° centred at the origin and starting from the point $(3, 0)$.

$$\sin \theta = \frac{y}{r}$$

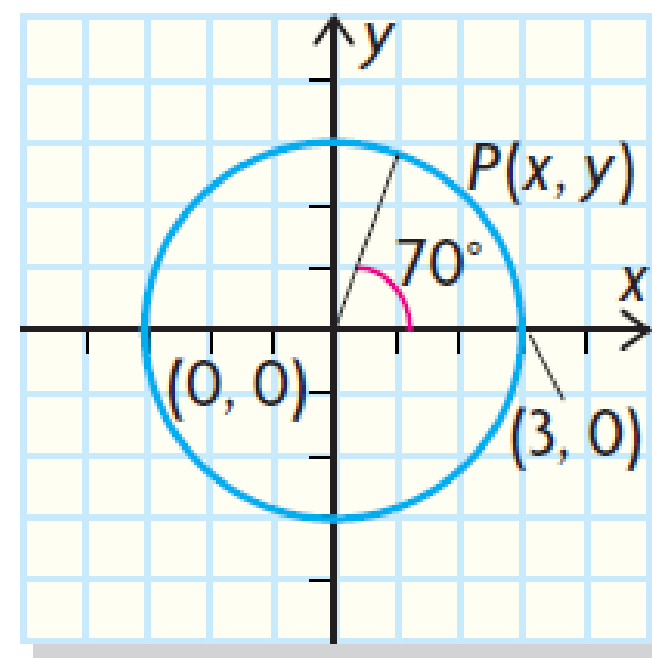
$$x = r \cos \theta \text{ and } y = r \sin \theta$$

$$\text{Therefore, } P(x, y) = (r \cos \theta, r \sin \theta)$$

The coordinates of any point $P(x, y) = (r \cos \theta, r \sin \theta)$

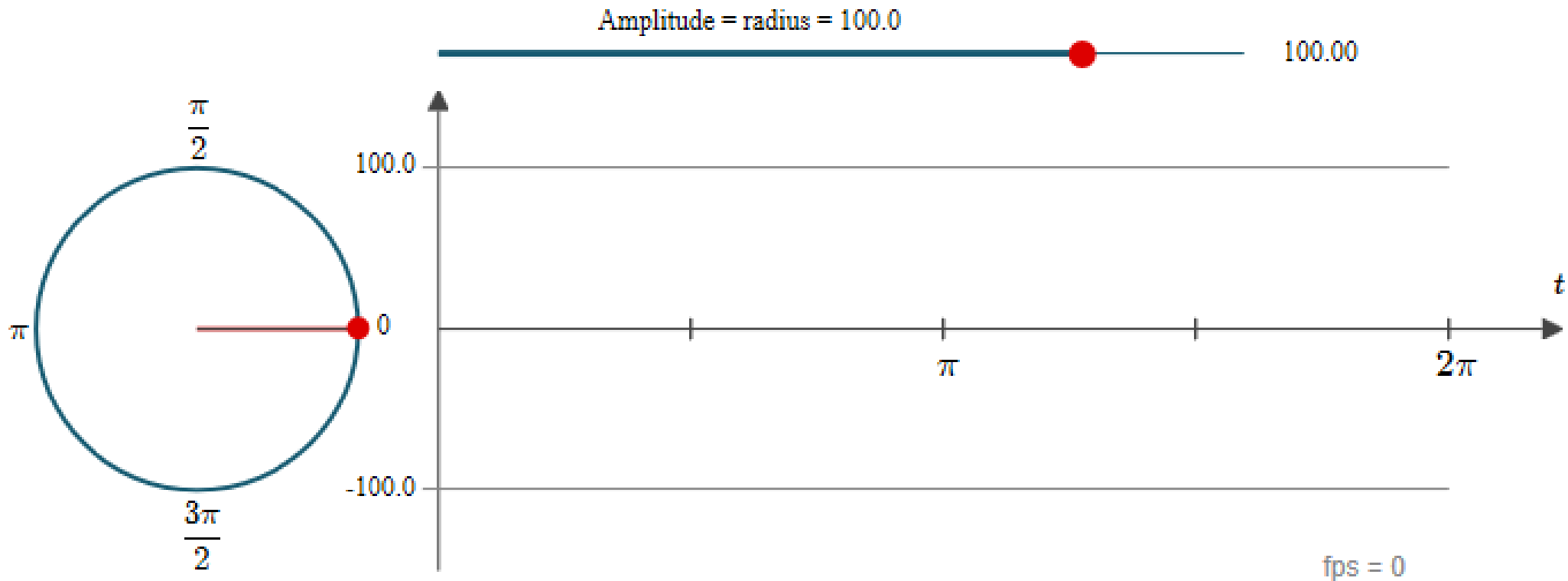
$$P(x, y) = (3 \cos 70^\circ, 3 \sin 70^\circ)$$

$$\cong (1.03, 2.82)$$



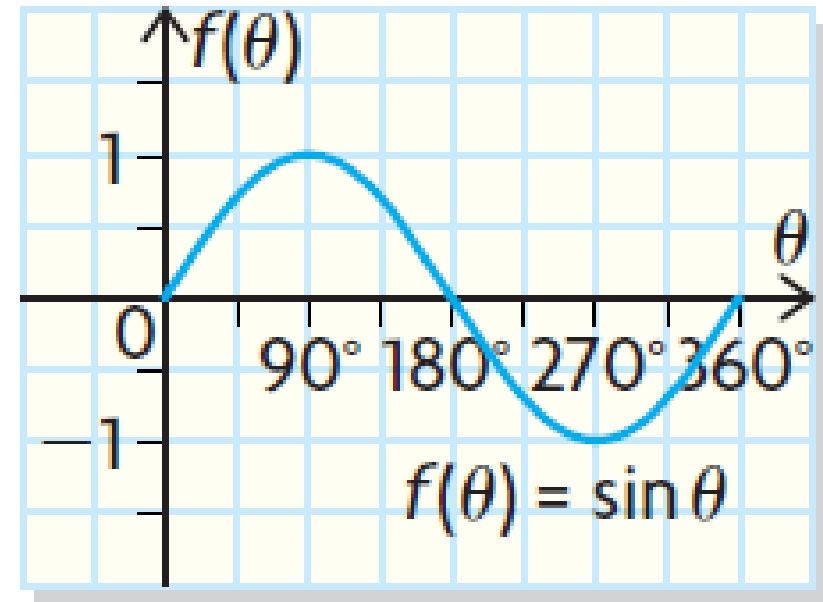
Graphs of $y = a\sin\theta$ and $y = a\cos\theta$

- <http://www.intmath.com/trigonometric-graphs/1-graphs-sine-cosine-amplitude.php>



In Summary (1 of 2)...

- The graph of $f(\theta) = \sin \theta$ has these characteristics:
 - ❖ The period is 360°
 - ❖ The amplitude is 1, the maximum value is 1, and the minimum value is -1
 - ❖ The domain is $\{\theta \in \mathbf{R}\}$, and the range is $-1 \leq f(\theta) \leq 1$
 - ❖ The zeros are located at $0^\circ, 180^\circ, 360^\circ, \dots$



In Summary (2 of 2)...

- The graph of $f(\theta) = \cos \theta$ has these characteristics:
 - ❖ The period is 360°
 - ❖ The amplitude is 1, the maximum value is 1, and the minimum value is -1
 - ❖ The domain is $\{\theta \in \mathbf{R}\}$, and the range is $-1 \leq f(\theta) \leq 1$
 - ❖ The zeros are located at $90^\circ, 270^\circ, 450^\circ, \dots$

