

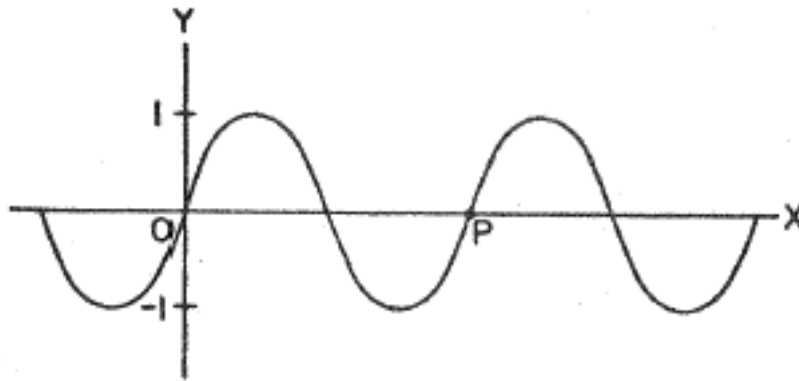
Precalculus  
Sinusoidal Functions v3  
CALCULATOR ALLOWED

Name \_\_\_\_\_

1. On the graph of  $y = \sin x$ , as  $x$  increases on  $x \in \left[-\frac{1}{4}, \frac{1}{4}\right]$ , the function  $y$

- (a) decreases                      (b) is constant                      (c) increases  
(d) decreases, then increases                      (e) increases, then decreases

2. This is the graph of  $y = \sin \frac{1}{3}x$ .



What is the  $x$ -value of P?

- A.  $\frac{\pi}{3}$     B.  $\frac{2\pi}{3}$     C.  $2\pi$                       D.  $3\pi$                       E.  $6\pi$

3. Given  $g(x) = 3 + 2\sin\left[\frac{\pi}{4}(x+1)\right]$ , which of the following statements is true?

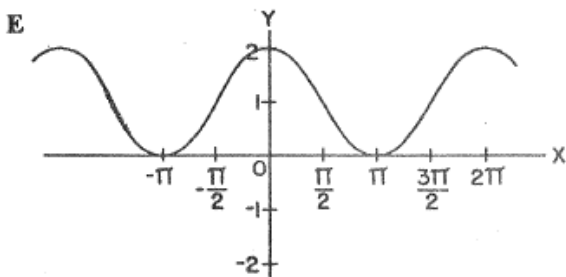
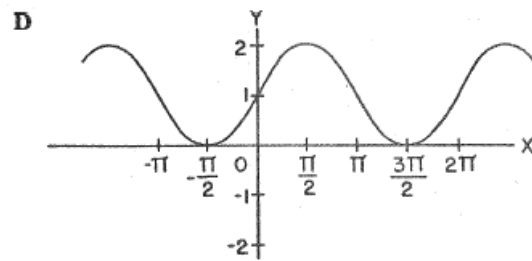
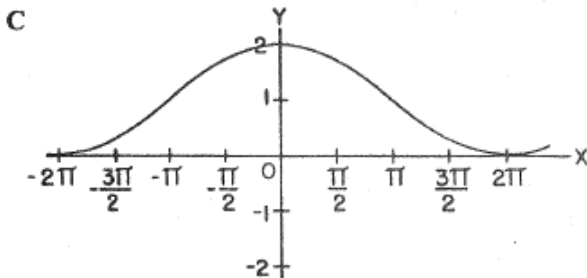
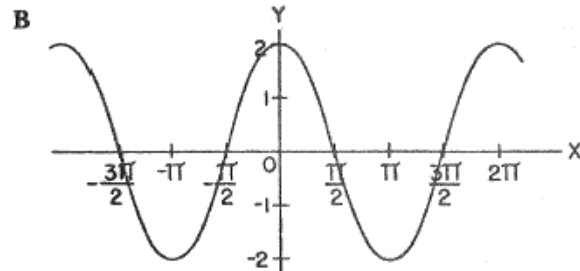
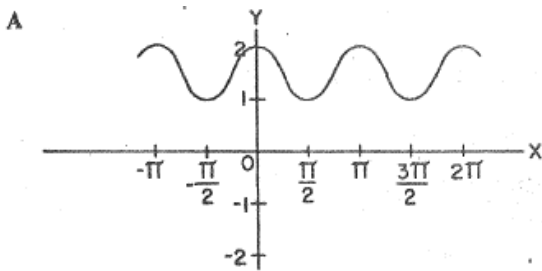
- I. The amplitude of  $g(x)$  is 2.  
II. The period of  $g(x)$  is  $\frac{\pi}{4}$ .  
III. The phase shift is -1.

- (a) I only                      (b) II only                      (c) I and II only  
(d) I and III only                      (e) I, II and III

4. What is the smallest positive value where  $y = 3 - 2\csc\left[\frac{\pi}{8}(x-1)\right]$  has a vertical asymptote?

- (a) 1    (b) 5    (c) 9    (d) 13    (e) 17

5. Which of the following is the graph of  $y = 1 - \cos\left(\frac{1}{2}x\right)$ ?

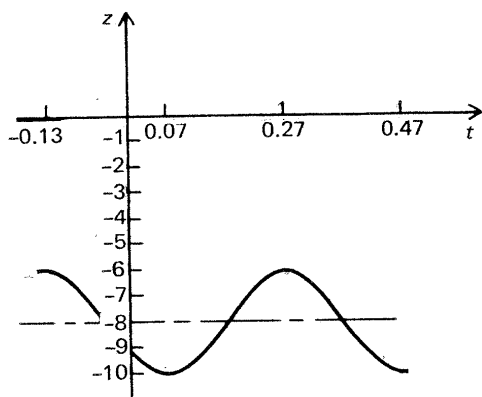


Show all work; round non-integer values to the nearest thousandth. List traits for ALL sketches. Sketch carefully and show relevant coordinate points as needed. 10 points each.

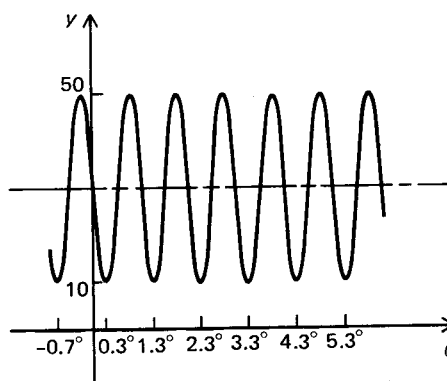
6. Sketch the primary cycle of  $y = -3 + 5 \cos [8(\theta + 20^\circ)]$ .

7. Sketch one cycle of  $y = 2 + 5 \csc \left[ \frac{\pi}{4}(x - 2) \right]$ .

8. Find a cosine equation for this graph:



9. Find a sine equation for this graph:



10. If  $H(x) = -1 + 4 \cos\left[\frac{\pi}{6}(x-13)\right]$ , find the first four negative values of  $x$  where  $H(x) = -4$ .

11. A weight attached to the end of a long spring is bouncing up and down. As it bounces, its distance from the floor varies sinusoidally with time. You start a stopwatch. When the stopwatch reads 0.3 seconds, the weight first reaches a high point 60 centimeters above the floor. The next low point, 40 centimeters above the floor, occurs at 1.8 seconds.

- a. Sketch the graph of this sinusoidal function.
- b. Write the particular equation expressing distance from the floor in terms of the number of seconds the stopwatch reads. Write traits.
- c. Predict the distance from the floor when the stopwatch reads 17.2 seconds.
- d. What was the distance from the floor when you started the stopwatch?