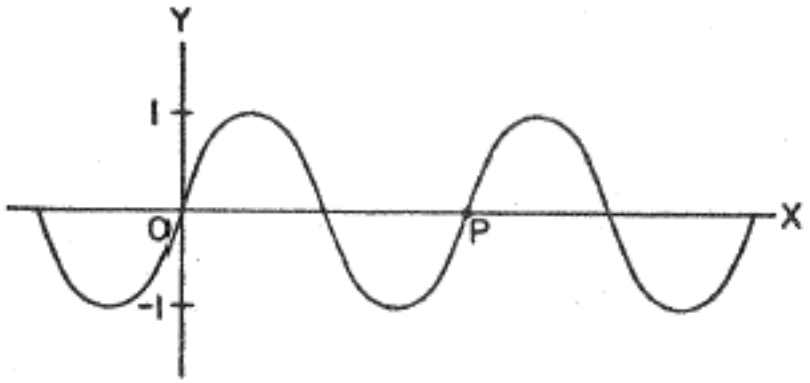
Precalculus Name _____
Sinusoidal Functions v2
CALCULATOR ALLOWED

1. On the graph of $y = \cos x$, 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 $y = \sin 3x$.



What is the x-value of P?

(a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) 2π (d) 3π (e) 6π

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 8.
III. The phase shift is -1.

(a) I only (b) II only (c) I and II only

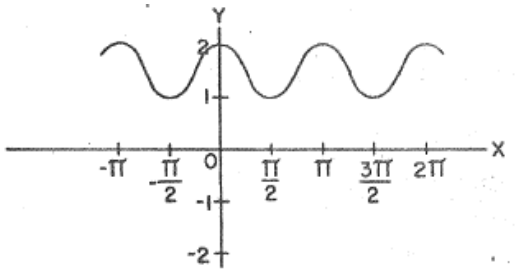
(d) II and III only (e) I, II and III

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

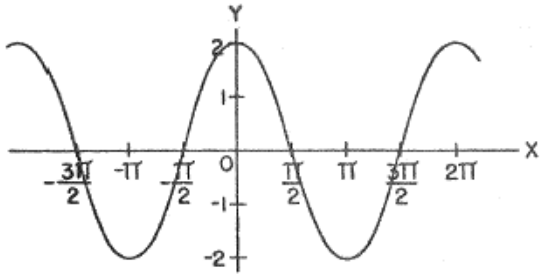
(a) 1 (b) 5 (c) 9 (d) 13 (e) 17

5. Which of the following is the graph of $y = \frac{3}{2} + \frac{1}{2}\cos 2x$?

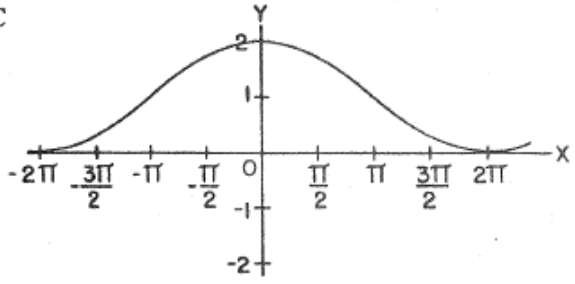
A



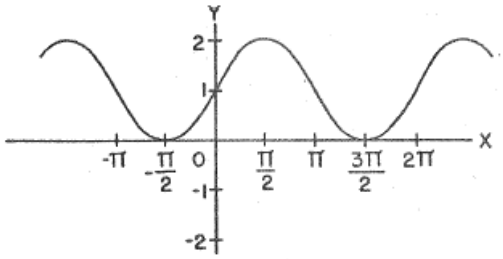
B



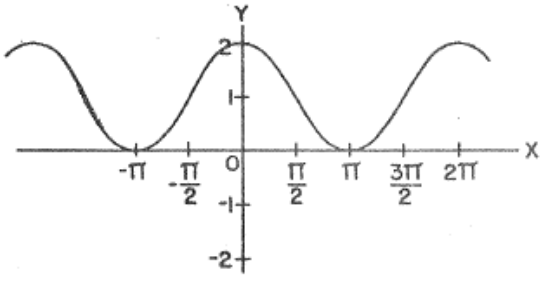
C



D



E

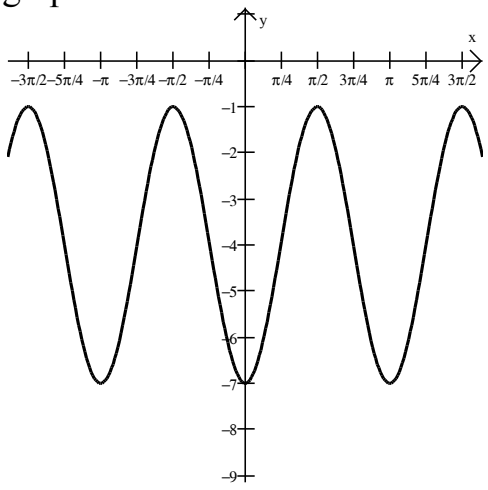


Show all work; round non–integer values to the nearest thousandth. List traits for ALL sketches. Sketch carefully and show relevant coordinate points as needed. 10 points each.

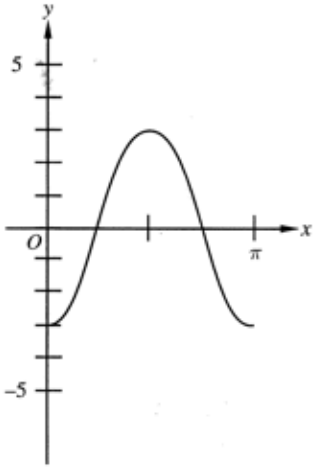
6. Sketch the primary cycle of $y = -1 + 5\cos\left[\frac{\pi}{8}(x-1)\right]$.

7. Sketch one cycle of $y = 2 - 5\sin\left[\frac{1}{2}\left(x + \frac{\pi}{2}\right)\right]$.

8. Find a cosine equation for this graph:



9. Find a sine equation for this graph:



10. If $H(x) = -1 + 4\cos\left[\frac{\pi}{3}(x-11)\right]$, find the first four negative values of x where $H(x) = 0$.

11. A space ship is in an elliptical orbit around Earth. At time t=0, it is at its apogee (highest point) which is d = 1000 km. It reaches its perigee of d = 100 km 50 minutes later.

a) Assuming d varies sinusoidally with time t, sketch a graph of one cycle and find the equation.

b) Isolate t as a function of d.

c) If the ship is only in communication range when it is below 700 km, for how many minutes is the ship out of range?