Precalculus
Sinusoidal Functions v3
CALCULATOR ALLOWED

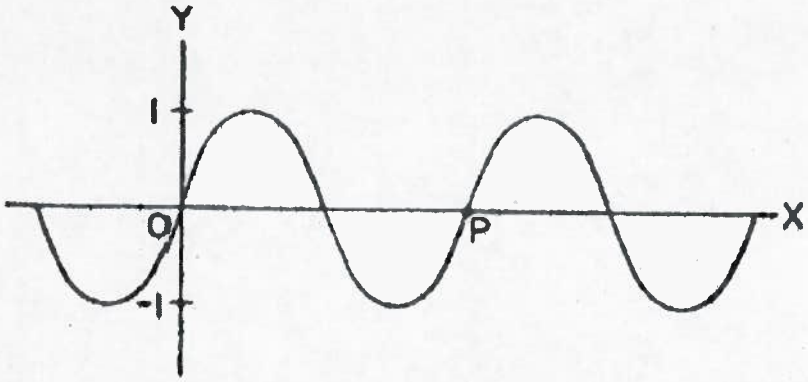
Name SOLUTION KEY

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. 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 $\frac{\pi}{4}$.

III. The phase shift is -1.

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

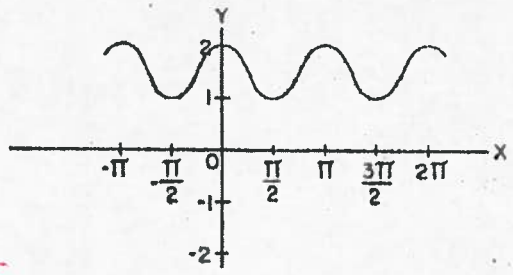
(d) I and III only (e) I, II and III

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

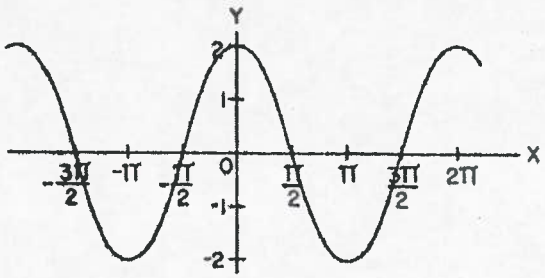
(a) 1 (b) 5 (c) 9 (d) 13 (e) 17

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

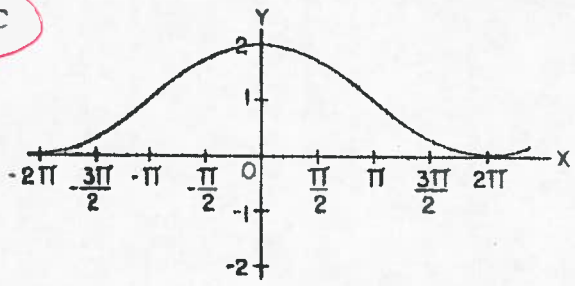
A



B



C



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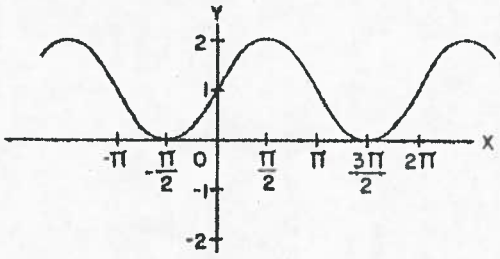
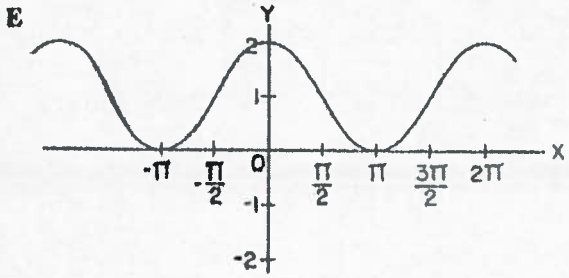


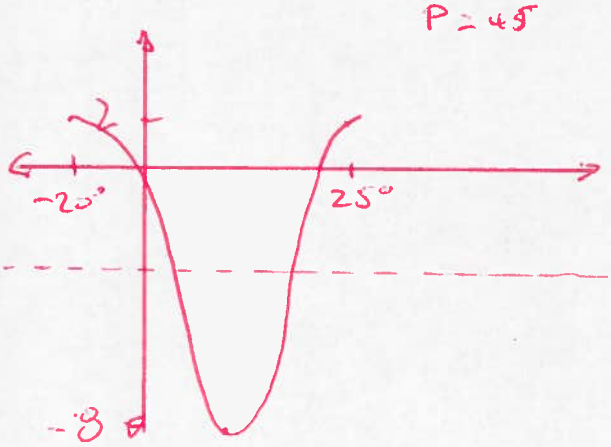
E



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.

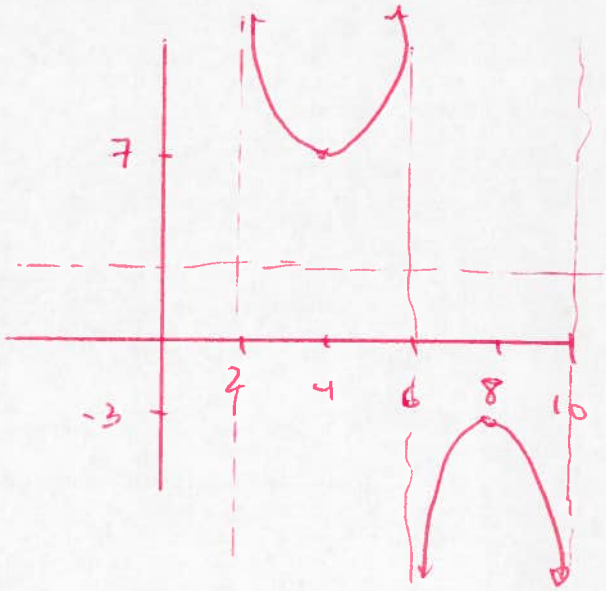
6. Sketch the primary cycle of $y=-3+5\cos\left[8(\theta+20^\circ)\right]$.

P = 45

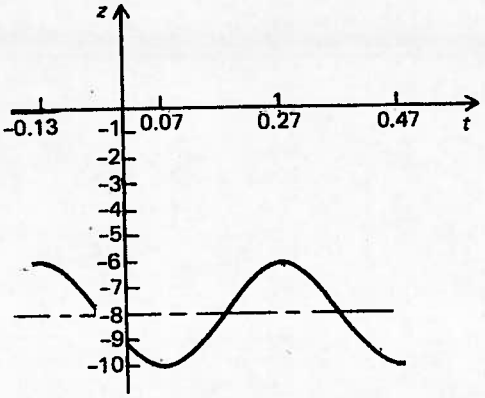


7. Sketch one cycle of $y=2+5\csc\left[\frac{3\pi}{4}(x-2)\right]$.

P = 8



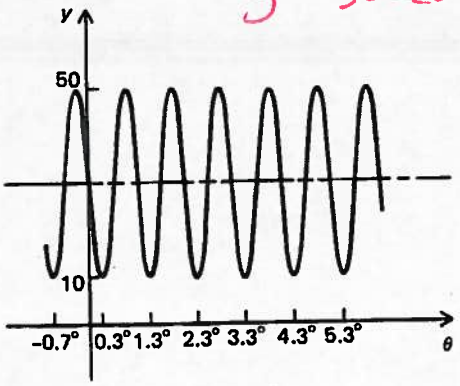
8. Find a cosine equation for this graph:



$y=-8+2\cos\left[5\pi(t+.13)\right]$

9. Find a sine equation for this graph:

$y=30-20\sin\left[360(\theta-.05)\right]$



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

$$-4=-1+4\cos\left[\frac{\pi}{6}(x-13)\right]$$

$$-3/4=\cos\left[\frac{\pi}{6}(x-13)\right]$$

$$\pm 2.419 \pm 2\pi n = \frac{\pi}{6}(x-13)$$

$$\pm 4.620 \pm 12n = x-13$$

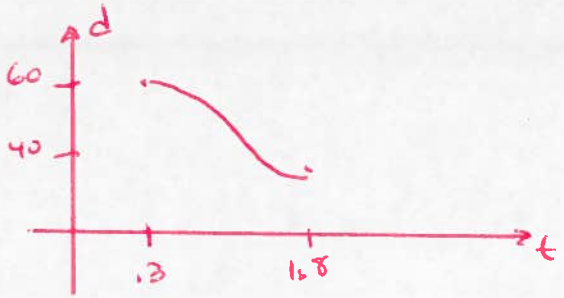
$$x = \begin{cases} 17.620 \pm 12n \\ 5.380 \pm 12n \end{cases}$$

$$x=\{-6.38,-3.62,-18.38,-15.38\}$$

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?

c)



d) $d(0)=45$ cm

b) $d=50+10\cos\left[\frac{2\pi}{3}(t-.3)\right]$

c) $d(17.2)=43.309$ cm