

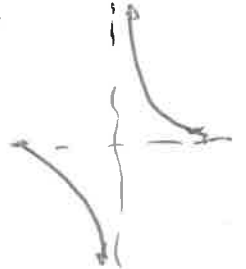
1. Given $g(x) = 2 + 3\sec\left[\frac{\pi}{8}(x+1)\right]$, which of the following statements is true?

- I. The amplitude of $g(x)$ is 3.
- II. The period of $g(x)$ is 8.
- III. The phase shift is 1.

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

2. On the graph of $y = -\tan x$, as x increases on $x \in [0, \pi]$, the function y

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



3. What is the smallest positive x -value for which $y = 3 - 2\cos\left[\frac{\pi}{8}(x+3)\right]$ has a point at a maximum?

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



4. The price of gasoline over the past year seems to have varied sinusoidally with time. On June 10th (day 161), the cost was its highest, which was \$3.97. On December 10th (day 344), the cost was its lowest, which was \$2.97. What would the vertical shift of the function be?

(a) \$3.97

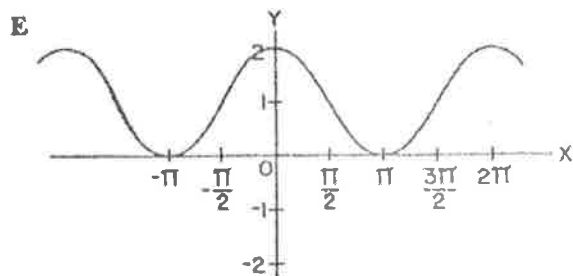
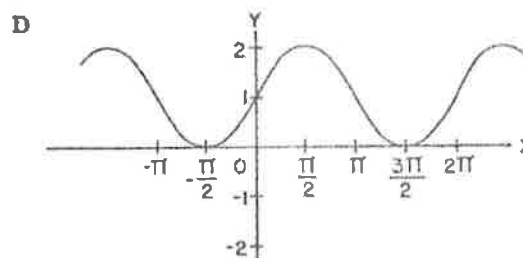
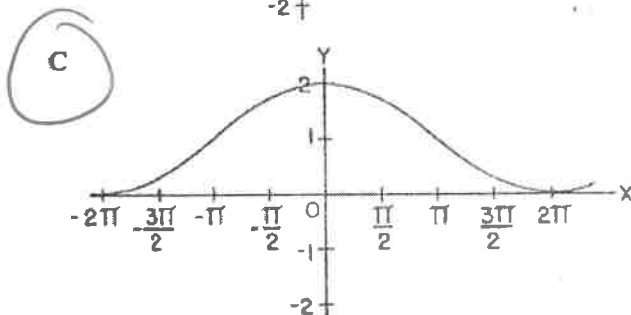
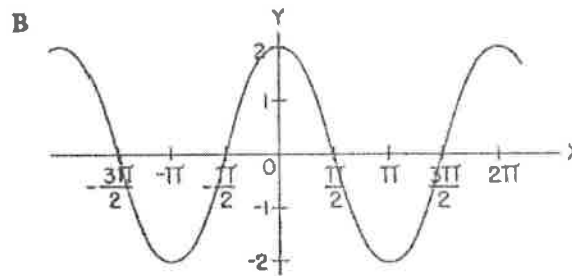
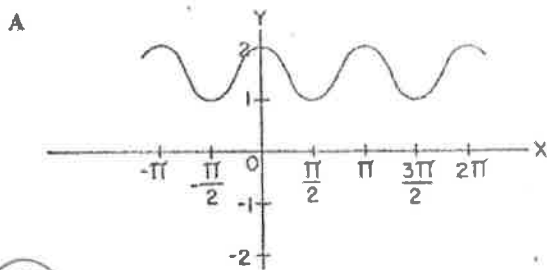
(b) \$2.97

(c) \$3.47

(d) \$1.97

(e) \$1.00

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



(a) A

(b) B

(c) C

(d) D

(e) E

Honors PreCalc '21-22

Name SOLUTION KEY

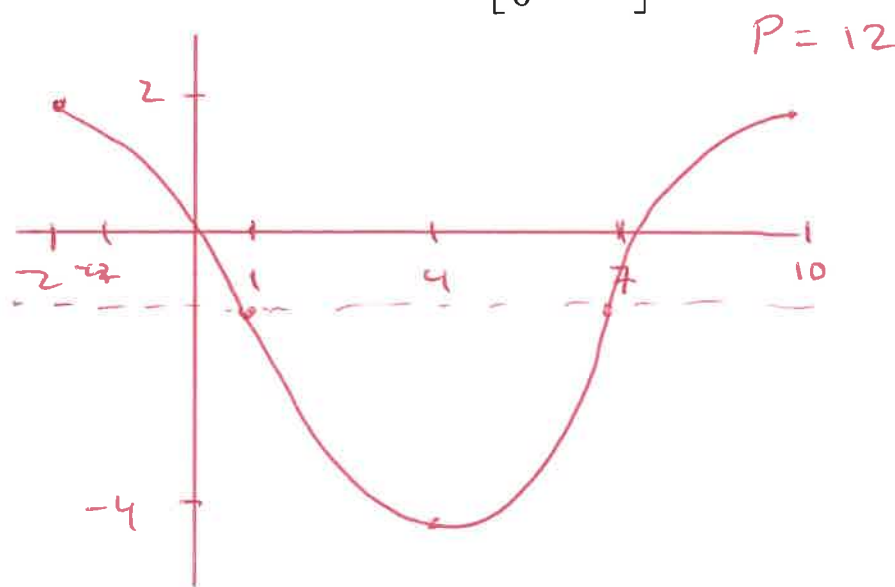
Chapter 2 Test--FR

Calculator required

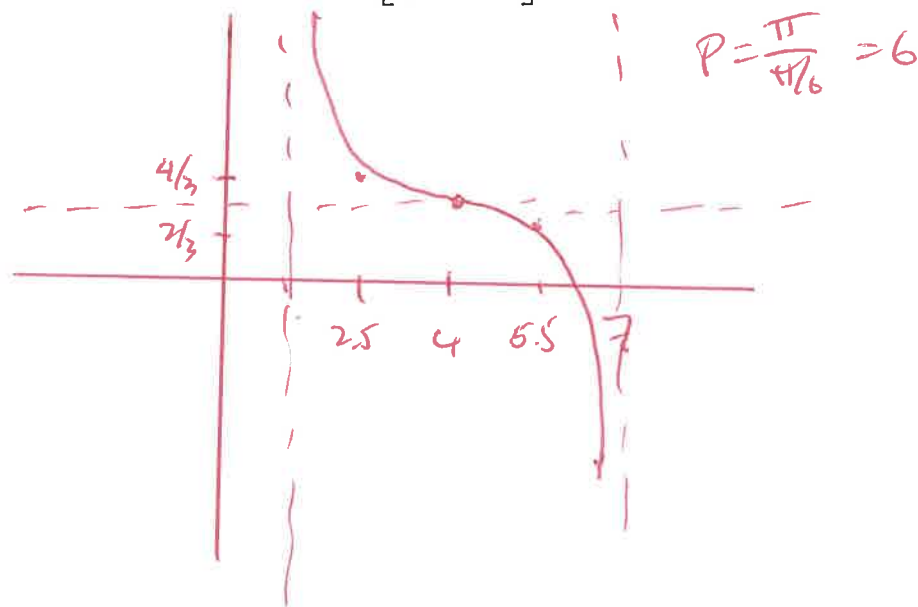
Score _____

Round all answers to 3 decimals

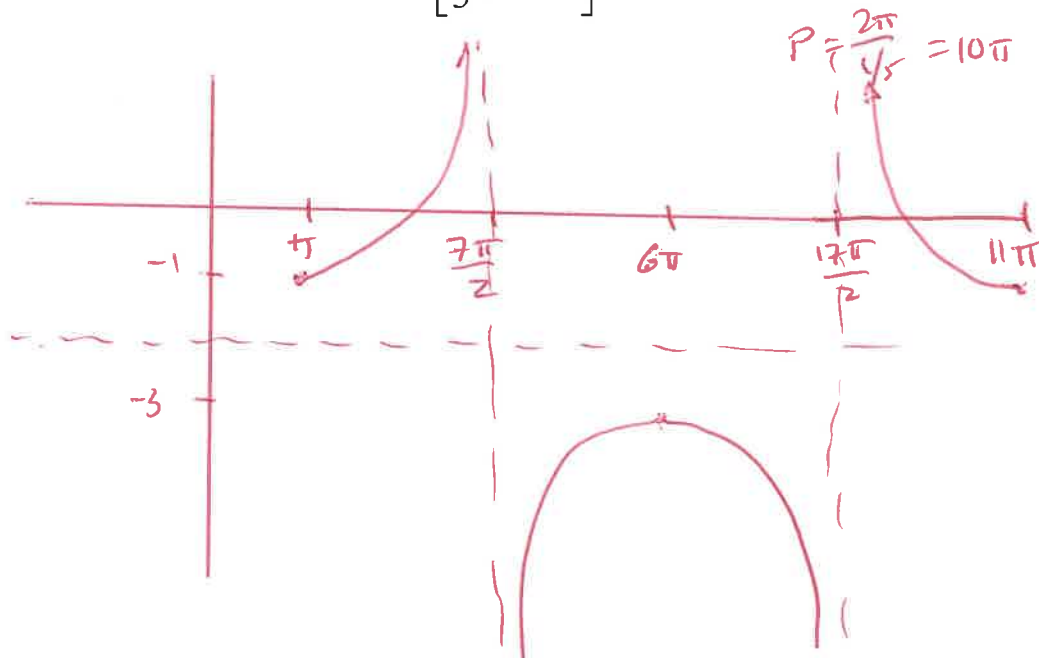
6. Sketch one cycle of $y = -1 + 3\cos\left[\frac{\pi}{6}(x+2)\right]$



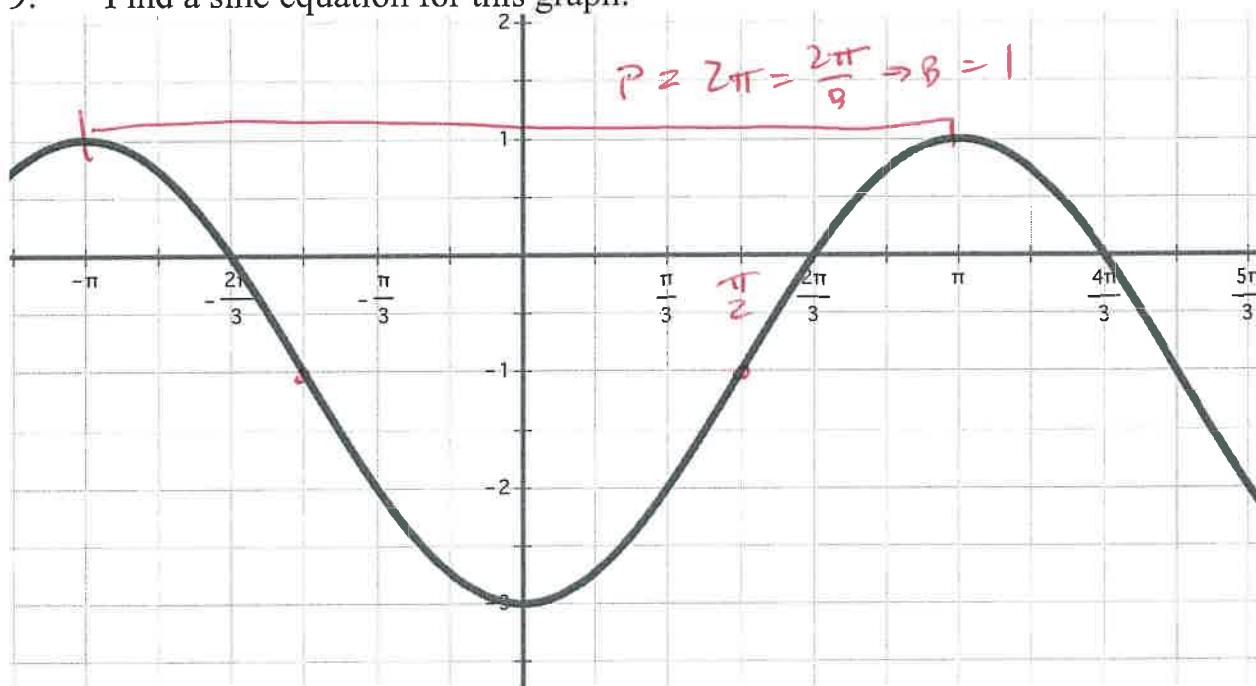
7. Sketch one cycle of $y = 1 + \frac{1}{3}\cot\left[\frac{\pi}{6}(x-1)\right]$



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



9. Find a sine equation for this graph:



$$y = -1 + 2 \sin\left(x - \frac{\pi}{2}\right)$$

10. If $H(x) = -1 + 3\cos\left[\frac{\pi}{6}(x+2)\right]$, find the first three negative values of x where $H(x) = -1.3$.

$$-1.3 = -1 + 3\cos\left[\frac{\pi}{6}(x+2)\right]$$

$$-0.3 = 3\cos\left[\frac{\pi}{6}(x+2)\right]$$

$$-0.1 = \cos\left[\frac{\pi}{6}(x+2)\right]$$

$$\left. \begin{array}{l} 1.671 \pm 2\pi n \\ -1.671 \pm 2\pi n \end{array} \right\} = \frac{\pi}{6}(x+2)$$

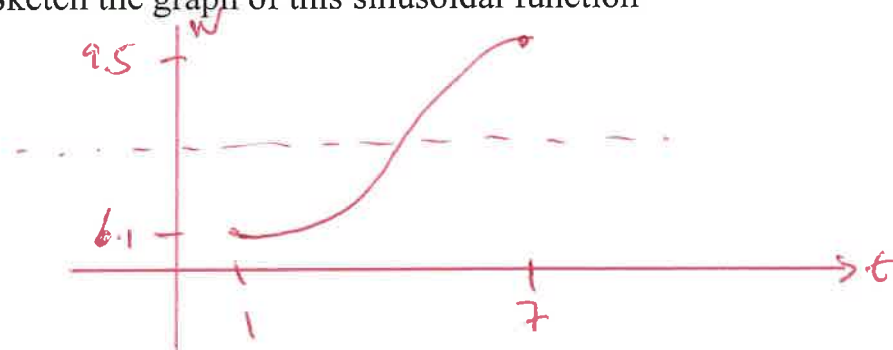
$$\left. \begin{array}{l} 3.191 \pm 12n \\ -3.191 \pm 12n \end{array} \right\} = x+2$$

$$\left. \begin{array}{l} 1.191 \pm 12n \\ -5.191 \pm 12n \end{array} \right\} = x$$

$$x = \{-5.191, -16.809, -17.191\}$$

11. Wind farming is a thriving business in the Montezuma Hills, Solano County, just outside of Rio Vista. There are several windmill systems harnessing wind-power, converting it to electricity, and selling it to PG&E. Over the course of a year, the daily average wind speed varies sinusoidally with the month. In mid-January, the windspeed is at its lowest at 6.1 mph. By mid-July, it reaches a high of 9.5 mph. Consider mid-January to be $t=1$ and mid-July to be $t=7$.

a. Sketch the graph of this sinusoidal function



b. Write the particular equation expressing the daily average wind speed.

$$W = 7.8 + 1.7 \cos \frac{\pi}{6} (t-7) \quad \text{or} \quad W = 7.8 - 1.7 \cos \frac{\pi}{6} (t-1)$$

c. What is the daily average wind speed in mid-April? How about at the **end** of October? $10.5 = t$ 7.8 $t = 4$

$$W(4) = \cancel{8.1} 7.6 \text{ MPH}$$

$$W(10.5) = \overset{360}{7.9} \cancel{7} \text{ MPH}$$

d. When is the second time during the year that the daily average wind speed is 7.8 mph?

$$7.8 = 7.8 + 1.7 \cos \frac{\pi}{6} (t-7)$$

$$0 = \cos \frac{\pi}{6} (t-7)$$

$$\pm \frac{\pi}{2} \pm 2\pi n = \frac{\pi}{6} (t-7)$$

$$\pm 3 \pm 12n = t-7$$

$$\left. \begin{array}{l} 10 \pm 12n \\ 1 \pm 12n \end{array} \right\} = t$$

$$\boxed{t=10}$$