PreCalc '14-15
Chapter 9 Test--MC
Calculator NOT Allowed

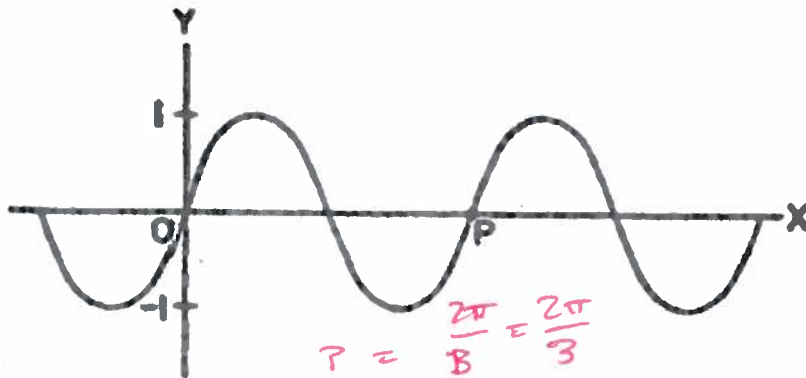Name _SOLUTION Key_

Score _____

Form A

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

(a) decreases   (b) is constant   (c) increases

(d) decreases, then increases   (e) increases, then decreases

2. This is the graph of $y = \sin(3x)$.

$P = \dfrac{2\pi}{B} = \dfrac{2\pi}{3}$

What is the x-value of P?

A. $\dfrac{\pi}{3}$ B. $\dfrac{2\pi}{3}$ C. 2π D. 3π E. 6π

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

~~I.~~ The vertical shift of $g(x)$ is -4. $k = 1$

~~II.~~ The period of $g(x)$ is $\dfrac{\pi}{4}$. $P = \dfrac{2\pi}{\pi/2} = 4$

III. The phase shift is -3.

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

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

4. What is the smallest positive value where $y = 3 - 2\cos\left[\frac{\pi}{8}(x-3)\right]$ has a point on the sinusoidal axis?
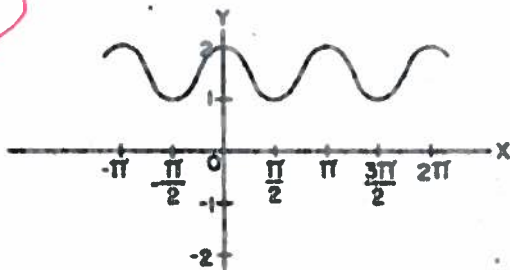
$P = 16$

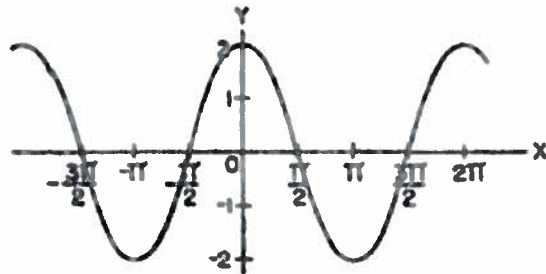   (a)   1   (b)   3   (c)   5   (d)   5   (e) 7

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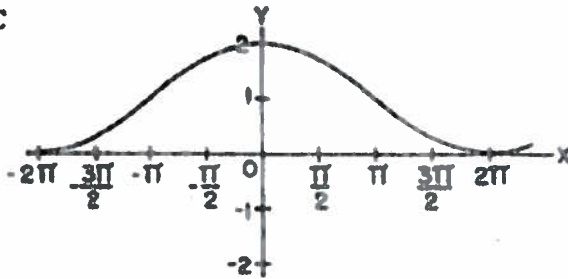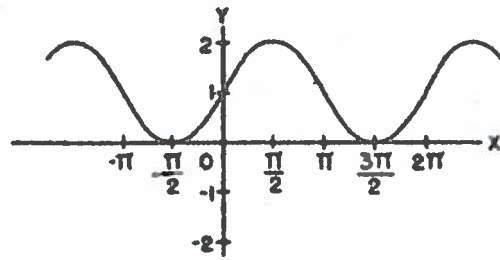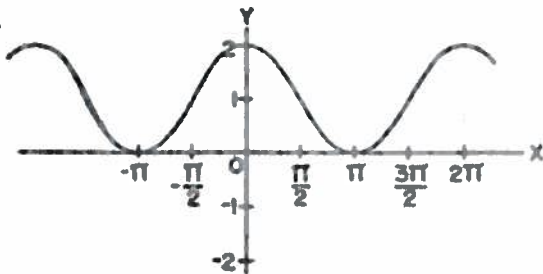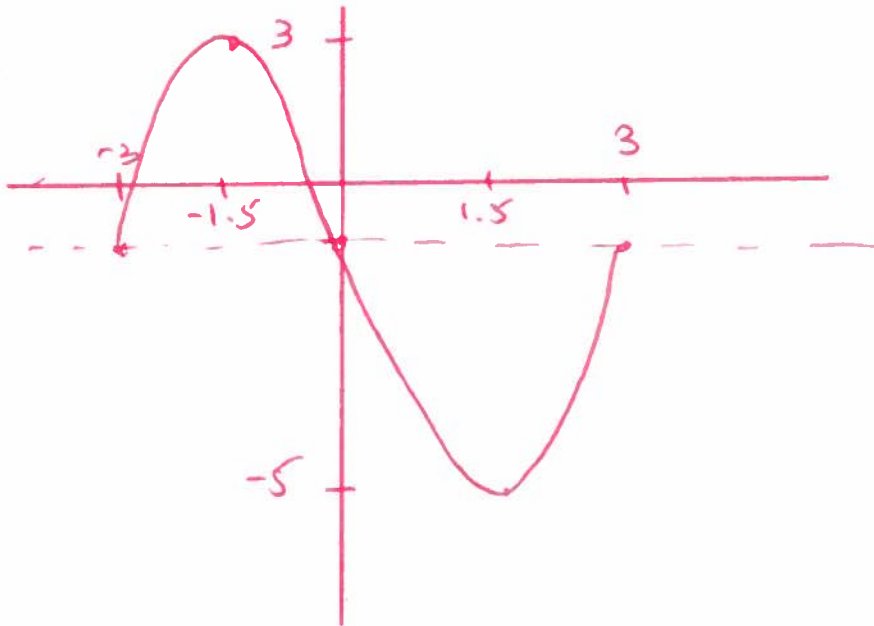
$k = \frac{3}{2}$

A

B

C

D

E

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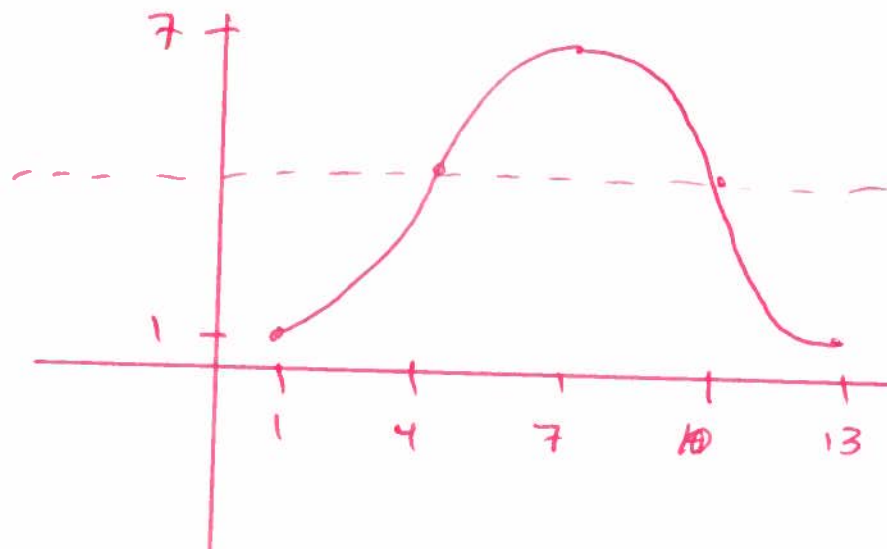Round all answers to 3 decimals

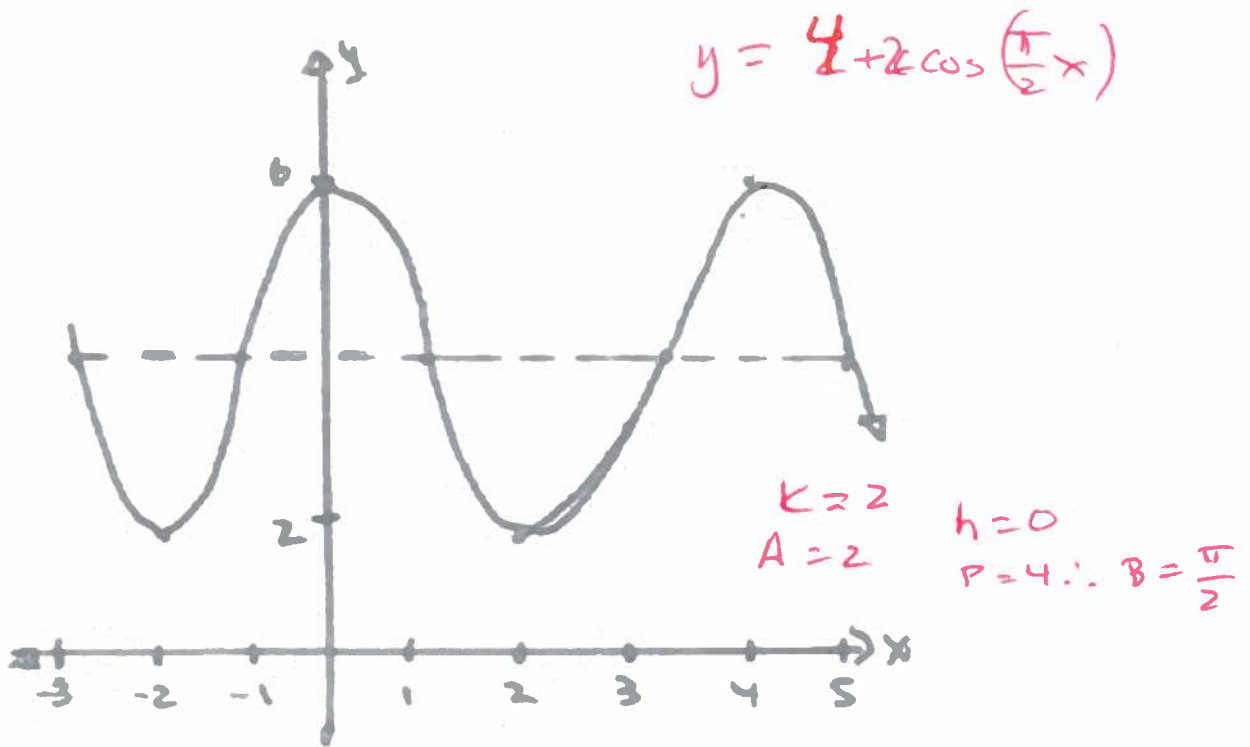Name _____Solution Key_____

Score _____

7.   Sketch one cycle of $H(x) = -1 + 4\sin\left[\dfrac{\pi}{3}(x+3)\right]$

8.   Sketch one cycle of $H(x) = 4 - 3\cos\left[\dfrac{\pi}{6}(x-1)\right]$

9. Find a cosine equation for this graph:

$$y = 4 + 2\cos\left(\tfrac{\pi}{2}x\right)$$

$$K = 2$$
$$A = 2$$
$$h = 0$$
$$P = 4 \therefore B = \tfrac{\pi}{2}$$

10. Find a sine equation for this graph:

$$K = -10 \qquad P = 60 \therefore B = \tfrac{\pi}{30}$$
$$A = 20$$
$$h = 25$$

$$y = -10 + 20\sin\tfrac{\pi}{30}(x - 25)$$

OR

$$y = -10 - 20\sin\tfrac{\pi}{30}(x + 5)$$
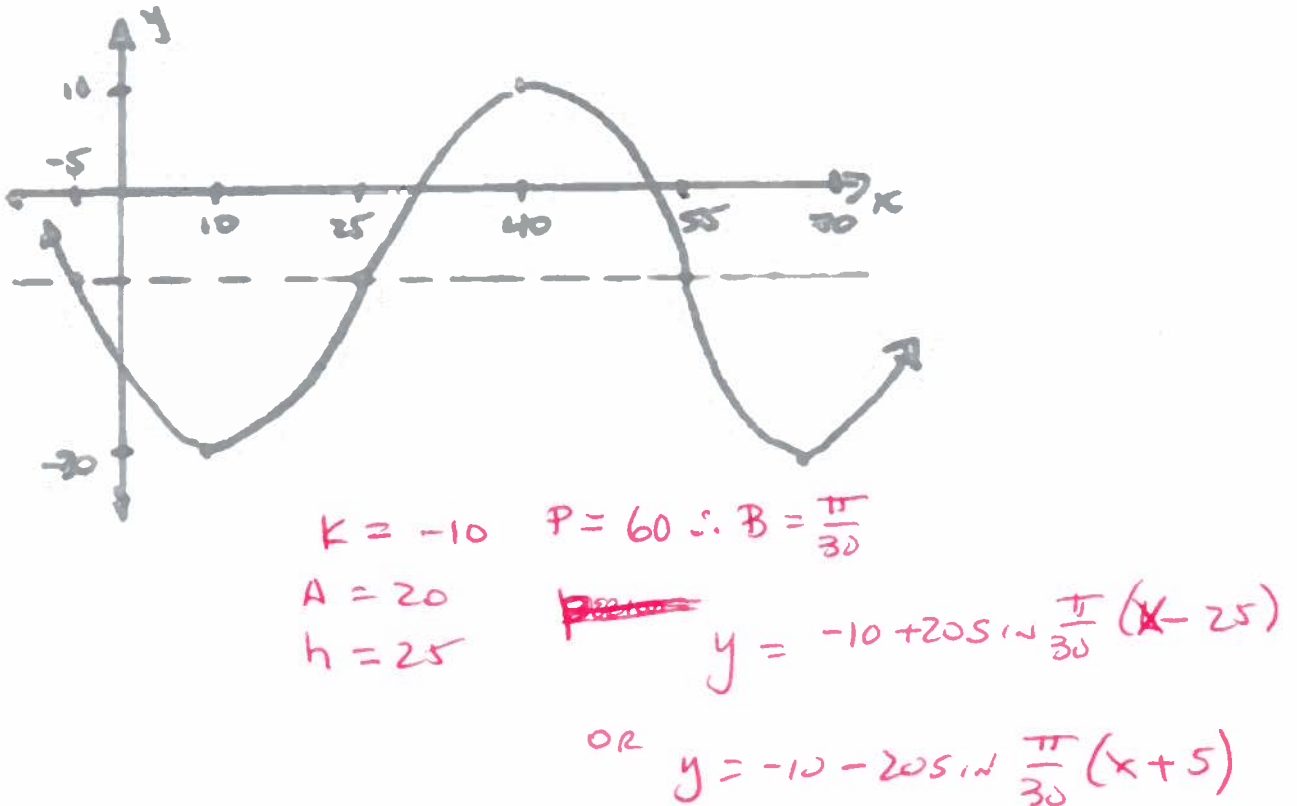
11. If $H(x) = -1 + 4\cos\left[\frac{\pi}{3}(x-2)\right]$, find the first three negative values of x where $H(x) = 1.3$.

$1.3 = -1 + 4\cos\frac{\pi}{3}(x-2)$

$-2.3 = 4\cos\frac{\pi}{3}(x-2)$

$.575 = \cos\frac{\pi}{3}(x-2)$

$\left.\begin{array}{l} .958 \pm 2\pi n \\ -.958 \pm 2\pi n \end{array}\right\} = \frac{\pi}{3}(x-2)$

$\left.\begin{array}{l} .915 \pm 6n \\ -.915 \pm 6n \end{array}\right\} = x - 2$

$\left.\begin{array}{l} 2.915 \pm 6n \\ 1.085 \pm 6n \end{array}\right\} = x$

$x = -3.085, -4.915, -9.085$

12. While driving on HWY 280 from San Francisco to San Jose during rush hour, a driver notices that the speed of traffic seems to vary sinudoidally with the distance form San Francisco. There are bottle-necks at HWY 380, HWY 92, Stanford University and Cupertino where the speed of the traffic drops to 5 mph. Half way between each pair of sites, the speed gets up to 75 mph. The distance between each of these bottle-necks is 6 miles and 380 is 3.5 miles south of San Francisco.

a. Sketch one cycle of the situation.
b. Find an equation that represents s in terms of d.
c. What is the speed of the traffic 7.2 miles south of San Francisco?
d. Between HWY 92 and Stanford, at what two distances from San Francisco is the speed of traffic 60 mph?
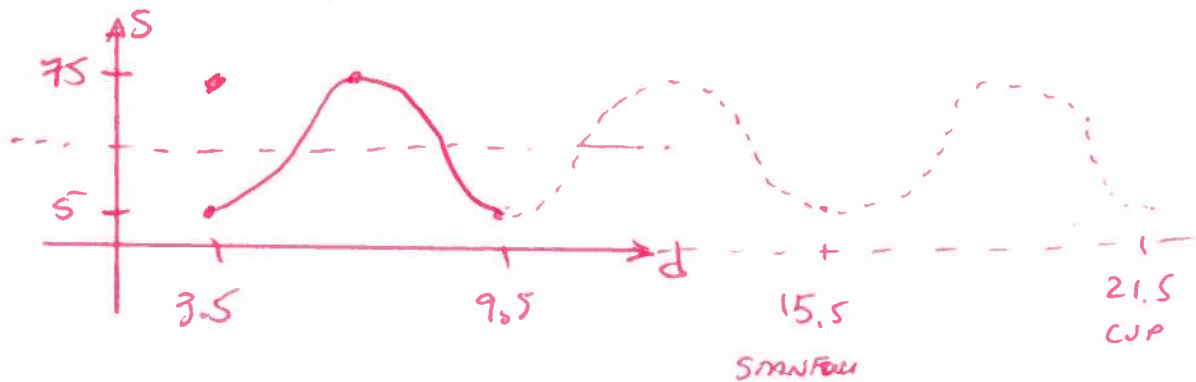
b) $S = 40 \mp 35 \cos \frac{\pi}{3}(d-3.5)$

c) $d = 7.2 \rightarrow S = 40 - 35 \cos\left[\frac{\pi}{3}(7.2-3.5)\right] = \boxed{66.010 \text{ MPH}}$

d) $60 = 40 - 35 \cos \frac{\pi}{3}(d-3.5)$

$-.571 = \cos \frac{\pi}{3}(d-3.5)$

$\left.\begin{array}{c} 2.179 \pm 2\pi n \\ -2.179 \pm 2\pi n \end{array}\right\} = \frac{\pi}{3}(d-3.5)$

$\left.\begin{array}{c} 2.081 \pm 6n \\ -2.081 \pm 6n \end{array}\right\} = d-3.5$

$\left.\begin{array}{c} 5.081 \\ 1.419 \end{array}\right\} \pm 6n = d$

$\boxed{d = \quad}$

$d = 11.081 \text{ \& } 13.419$