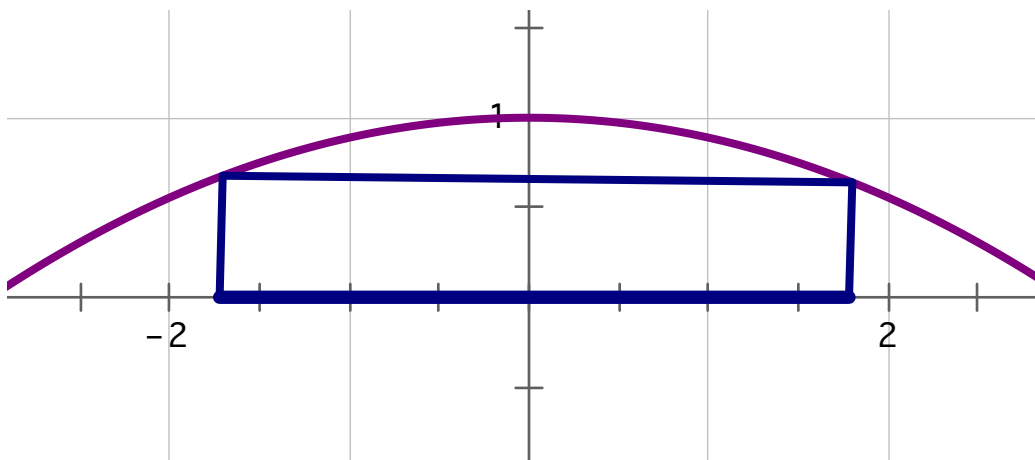


Directions: Round to 3 decimal places. Show all work.

1. What are all values of x for which the function $f(x) = 2 - 3x - x^2 + \frac{1}{3}x^3$ is decreasing?

- a) $-1 < x < 3$ b) $-3 < x < 1$ c) $x < -3$ or $x > 1$
 d) $x < -1$ or $x > 3$ e) $(-\infty, \infty)$

2. A rectangle with one side on the x -axis has its upper vertices on the graph of $y = 1 - \frac{x^2}{9}$, as shown in the figure below. What is the maximum area of the rectangle?



- a) $\sqrt{3}$ b) $\frac{\sqrt{3}}{2}$ c) $\frac{2}{3}$ d) $\frac{4\sqrt{3}}{3}$ e) None of these

3. Consider the function $f(x) = \frac{x^4}{2} - \frac{x^5}{10}$. $f'(x)$, the *derivative* of f , attains its maximum value at $x =$

- a) 0 b) 3 c) 4 d) 5 e) Never

4. A differentiable function f has the property that $f(5) = 3$ and $f'(5) = 4$. What is the estimate for $f(4.8)$ using the local linear approximation for f at $x = 5$

- a) 2.2 b) 2.8 c) 3.4 d) 3.8 e) 4.6
-

5. If $\sin A = 0.8364$ and $\tan A = -1.5258$, $\angle A =$

a) $x = 0.99 \pm 2\pi n$

b) $x = 2.15 \pm 2\pi n$

c) $x = 5.29 \pm 2\pi n$

d) $x = 0.99 \pm 2\pi n$ v and $x = 2.15 \pm 2\pi n$

e) $x = 2.15 \pm 2\pi n$ and $x = 5.29 \pm 2\pi n$

6. $\lim_{x \rightarrow -2} \frac{x^3 + 8}{x^2 - 2x - 8} =$

a) -6 b) -2 c) $-\frac{1}{2}$ d) 0 e) dne

7. The graph of $f(x)$ can be obtained from the graph of $\sec x$ by applying, in order, a horizontal stretch by a factor of 2, a vertical stretch by a factor of 2, and a vertical shift down 3 units. The equation of f is

a) $f(x) = -3 + 2\sec 2x$

b) $f(x) = -3 + 2\sec \frac{x}{2}$

c) $f(x) = 2 - 3\sec 2x$

d) $f(x) = 2 - 3\sec \frac{x}{2}$

e) None of the above

8. The amplitude of the graph of $y = 3 + 2 \tan(x - \pi)$

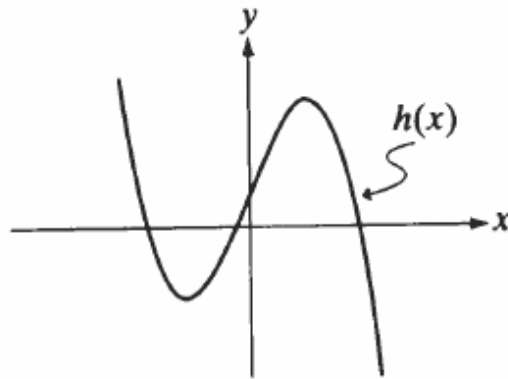
a) $\frac{\pi}{2}$

b) π

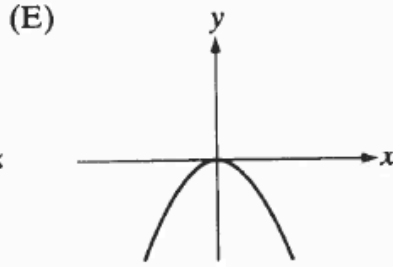
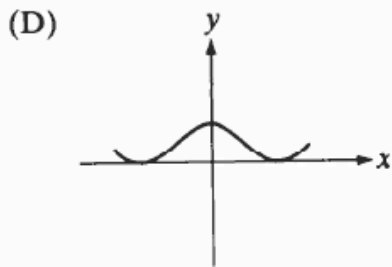
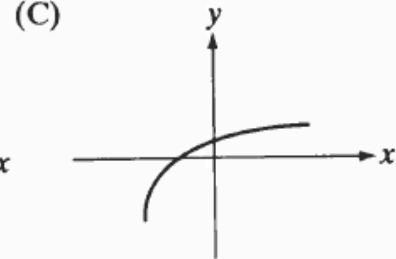
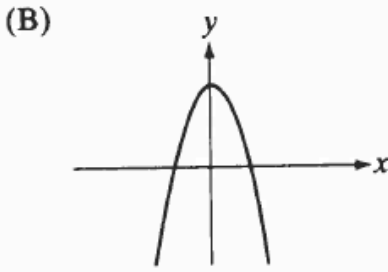
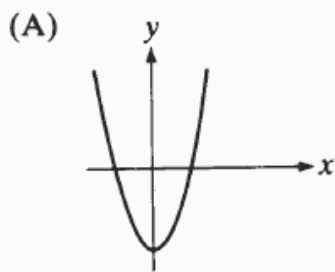
c) 2

d) 3

e) 2π



9. Suppose the function of h has the graph shown below. Which of the following could be the graph of $y = h'(x)$?



10. If $\cos\alpha = -\frac{12}{13}$ in QII, then $\sin 2\alpha =$

a) $-\frac{120}{169}$

b) $-\frac{169}{120}$

c) $-\frac{144}{169}$

d) $\frac{144}{169}$

e) $\frac{120}{169}$

11. The graph of $y = 3x^2 - x^3$ has a relative minimum at

a. $(0, 0)$ only

b. $(2, 4)$ only

c. $(0, 0)$ and $(2, 4)$

d. $(4, -16)$ only

e. None of these

12. What is the period of $y = \cot(3x)$?

a) $\frac{\pi}{3}$

b) $\frac{2\pi}{3}$

c) 2π

d) 6π

e) 12π

PreCalc Honors 16 -17

Name _____

Fall Final – Part II

Dr. Quattrin

CALCULATOR ALLOWED

Score _____

1. Solve exactly for $x \in [0^\circ, 360^\circ)$: $\sin \theta = \sin 2\theta$

2. $D_x \left[8x^3 - \frac{3}{x} + \frac{1}{x^3} - 2\sqrt[3]{x^5} + \pi^4 \right]$

3. Given $f(x) = 15x^4 + 122x^3 - 655x^2 + 486x - 72$, use your graphing calculator to:

a) Sketch a complete graph. State the window used.

b) Find the zeros.

c) Find all the extreme points.

4a. Find the zeros, algebraically, of $y = 3x^3 - 4x^2 - 59x + 20$. Show the synthetic division.

4b. Find the extreme points of $y = 3x^3 - 4x^2 - 59x + 20$. Show the derivative.

5. The stock market goes through cycles of growth and loss referred to as Bull and Bear Markets. A Bull market is characterized by increasing stock prices, while a Bear market has decreasing prices. A study of the gains and losses from 1873 to the present shows that highs generally reach 400% growth while the lows reach -60% as a loss. The last high was reached in the year 2000, while the last low was reached in 2009.

(a) Assuming the trend is sinusoidal, sketch the 2000 to 2009 cycle, and continue the trend to complete one cycle.

(b) Find an equation for your sketch.

(c) One investment marketing strategy suggests selling stocks when the gains are above 370% and buy when the stocks are growing less than 20%. Between what two times after 2000 should stocks be bought?

6. The motion of a particles is described by $\left\langle \frac{1}{4}t^4 - \frac{7}{2}t^2 - 6x + 5, t^2 - 6t - 3 \right\rangle$.

a) When is the particle moving both right and down?

b) When is the particle at rest?

c) What is the speed of the particle at $t = 1$?

PreCalc Honors 16 -17

Name _____

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Dr. Quattrin

NO CALCULATOR ALLOWED

Score _____

7. Find an inequality that has this sign pattern and solution:

$$\begin{array}{ccccccc} & +0 & + & 0 & - & 0 & + \\ y & & & & & & \\ x & \leftarrow & -1 & & \frac{5}{3} & & 7 & \rightarrow \end{array} \text{ and } x \in (-\infty, 1), \left(-1, \frac{5}{3}\right), \text{ or } (7, \infty)$$

8. Prove $\cos\left(x + \frac{\pi}{2}\right)\sin(x + \pi) = 1 - \cos^2 x$

9. Solve exactly for $x \in [0^\circ, 360^\circ)$: $\sin \theta = \sin 2\theta$

10. Find the traits and **sketch** of $y = 3x^3 - 4x^2 - 59x + 20$.

Domain:

Range:

Y – Int:

End Behavior:

Zeros:

Extreme Points:

