

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

1. Given this sign pattern $f'(x)$ $\leftarrow \begin{array}{ccc} - & 0 & + & 0 & - & 0 & - \\ & -4 & & -1 & & 2 & \end{array} \rightarrow$, at what value of x does f has a relative maximum point?

- a) -4 b) -1 c) 2 d) -4 and 2 e) $-4, -1,$ and 2
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2. $\lim_{x \rightarrow 2} \frac{x^3 - 2x - 4}{2x^2 - 5x + 2} =$

- a) 0 b) -2 c) 2 d) $\frac{10}{3}$ e) *dne*
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3. A farmer with 890 ft of fencing wants to enclose a rectangular area and then divide it into four pens with fencing parallel to one side of the rectangle. What is the largest possible total area of the four pens?

- a) 19,825.5 ft²
 - b) 19,802.5 ft²
 - c) 19,801.5 ft²
 - d) 19,902.5 ft²
 - e) 19,791.5 ft²
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4. A particle is moving along the x -axis such that its position is given by $x(t) = 4t^3 - 9t^2 + 6t + 2$ for $t \geq 0$. When is the particle moving right?

- a) $0 \leq t < \frac{1}{2}$
 - b) $\frac{1}{2} < t < 1$
 - c) $1 < t$
 - d) $0 \leq t < \frac{1}{2}$ and $1 < t$
 - e) $1 < t < \frac{3}{2}$
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5. If $\sin A = -0.336$ and $\tan A = 0.357$, $\angle A =$

a) $x = -0.343 \pm 2\pi n$

b) $x = 3.484 \pm 2\pi n$

c) $x = 0.343 \pm 2\pi n$

d) $x = -0.343 \pm 2\pi n$ and $x = 3.484 \pm 2\pi n$

e) $x = \pm 0.343 \pm 2\pi n$

6. The maximum value of $f(x) = \frac{5}{\sqrt{x}} + 2\sqrt{x}$ is

a) $\frac{5}{2}$ b) $\frac{2}{5}$ c) $\frac{\sqrt{10}}{5}$ d) $2\sqrt{10}$ e) No such value

7. The horizontal shift of the graph of $y = 3 + 2 \cot(4x - \pi)$

- a) $\frac{\pi}{2}$ b) π c) 2 d) 3 e) $\frac{\pi}{4}$
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8. 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 $\frac{1}{2}$, a vertical stretch by a factor of 2, and a vertical shift down 3 units. The equation of $f(x)$ 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
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9. 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) All real numbers
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10. If $\cos \alpha = \frac{12}{13}$ in QIV, then $\sec 2\alpha =$

- a) $-\frac{119}{169}$
 - b) $\frac{169}{119}$
 - c) $-\frac{120}{169}$
 - d) $-\frac{169}{120}$
 - e) $-\frac{169}{119}$
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11. If g is a differentiable function such that $g(x) < 0$ for all real numbers x and if $f'(x) = (x^2 - 4)g(x)$, which of the following is true?

- a) $f(x)$ has a relative maximum at $x = -2$ and a relative minimum at $x = 2$.
 - b) $f(x)$ has a relative minimum at $x = -2$ and a relative maximum at $x = 2$.
 - c) $f(x)$ has relative minima at $x = -2$ and $x = 2$.
 - d) $f(x)$ has relative maxima at $x = -2$ and $x = 2$.
 - e) It cannot be determined if f has any relative extrema.
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12. What is the period of $y = \csc(4x)$?

- a) $\frac{\pi}{4}$
 - b) $\frac{\pi}{2}$
 - c) π
 - d) 4
 - e) 2π
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PreCalc Honors 17 -18

Fall Final – Part II

Dr. Quattrin

CALCULATOR ALLOWED

Name _____

Score _____

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

2. Given $f(x) = 3x^4 + 26x^3 - 201x^2 + 352x + 160$, use your graphing calculator to:

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

b) Find the zeros.

c) Find all the extreme points.

3a. Find the zeros, algebraically, of $y = 5x^3 - 7x^2 - 28x + 12$ on $x \in (-3, 3]$. Show the synthetic division.

3b. Find the extreme points of $y = 5x^3 - 7x^2 - 28x + 12$ on $x \in (-3, 3]$. Show the derivative.

4. A baseball player who bats .300 over a season has streaks and slumps and rarely bats exactly .300 at a particular time. Let us assume that a player's batting average varies sinusoidally with time and ranges from a high of .425 to a low of .175. Let us further assume that each cycle lasts 54 games and he reaches his first high 10 games into the season.

a) Sketch two cycles of the situation.

b) Find an equation that represents B (batting average) in terms of time t .

c) When are the first three times that his batting average is .375?

5. The position of a particle is described by $\langle 2t^2 + 5t - 12, 2t^3 + t^2 - 13t + 6 \rangle$.

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 17 -18

Name _____

Fall Final – Part III

Dr. Quattrin

NO CALCULATOR ALLOWED

Score _____

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

$$\begin{array}{c} y \\ x \end{array} \begin{array}{c} + \quad 0 \quad + \quad 0 \quad - \quad 0 \quad - \\ \hline -4 \quad \quad 0 \quad \quad 2 \end{array} \text{ and } x \in (-\infty, -4) \cup (-4, 0)$$

7. Prove $\tan x \sin 2x - 2 \cos^2 x = -2 \cos 2x$

8. $D_x \left[7x^5 - \frac{1}{4x} + \frac{1}{x^4} - 14\sqrt[7]{x^3} + 5 \right]$

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

10. Find the traits and **sketch** of $y = 5x^3 - 7x^2 - 28x + 12$ on $x \in (-3, 3]$.

Domain:

Range:

Zeros:

Y - Int:

End Behavior (left):

Extreme Points:

End Behavior (right):

