Honors PreCalc 21 -22 Name _____

Fall Practice Final – Part I (25 minutes)

Dr. Quattrin

CALCULATOR ALLOWED Score_____

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

1. Determine that polynomial inequality that matches the sign pattern and solution.

$$\begin{array}{c} y \\ x \end{array} \quad \begin{array}{ccccccc} - & 0 & - & 0 & + & 0 & - \\ \hline & -5 & & 0 & & 7 & \end{array}; \quad x \in (0,\ 7)$$

a) $x(x+5)(x-7)<0$

b) $-x(x+5)(x-7)<0$

c) $-x(x+5)^2(x-7)>0$

d) $-x^4(x+5)^2(x-7)^6<0$

e) $-x(x+5)^2(x-7)<0$

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2. $\lim\limits_{x\to 2}\dfrac{x^3-2x-4}{2x^2-5x+2}=$

a) 0 b) -2 c) 2 d) $10/3$ 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 ft^2
b) 19,802.5 ft^2
c) 19,801.5 ft^2
d) 19,902.5 ft^2
e) 19,791.5 ft^2

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4. Solve the inequality $x^4 - x^3 - 6x^2 \geq 0$.

a) $x \in [-2, 3]$
b) $x \in [-3, 2]$
c) $x \in (-\infty, -2] \cup \{0\} \cup [3, \infty)$
d) $x \in (-\infty, -3] \cup \{0\} \cup [2, \infty)$
e) $x \in (-2, 0) \cup (0, 3)$

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

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

a) $\pi/2$ b) π c) 2 d) 3 e) $\pi/4$

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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 $1/2$, 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. Suppose f is a differentiable function such that $f(-1) = 2$ and $f'(-1) = \frac{1}{2}$. Using the line tangent to the graph of $f(x)$ at $x = -1$, find the approximation of $f(-1.1)$

a) -3.05 b) -1.95 c) $.95$ d) 1.95 e) 3.05

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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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12. What is the period of $y = \csc(4x)$?

a) $\pi/4$ b) $\pi/2$ c) π d) 4 e) 2π

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Fall Practice Final – Part II (40 minutes)

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

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*.

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

The motion of a particles is described by $x(t)=\frac{1}{4}t^4-\frac{7}{2}t^2-6t+5$.

a) When is the particle moving both left?

b) When is the particle at rest?

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

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Fall Practice Final – Part III (20 minutes)

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

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

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 $y = 5 + 4\cot\left[\frac{\pi}{4}(x-3)\right]$