PreCalculus Acc 19'-20' Name: Solution Key

Dr. Quattrin

Polynomial Test

CALCULATOR ALLOWED Score __________

Round to 3 decimal places. Show all work.

1. Find the zeros of $y = -2x^3 + 3x^2 + 36x - 54$. Show the algebraic work to support the zeros.

$-x^2(2x-3)+18(2x-3)$

$(18-x^2)(2x-3)=0$

$x=\pm\sqrt{18}=\pm 3\sqrt{2}\ ,\ x=3/2$

$(3/2, 0)\ (\pm 2\sqrt{3}, 0)$

2. Find the extreme points of $y = -2x^3 + 3x^2 + 36x - 54$. Show the derivative and algebra to support the critical values.

$\frac{dy}{dx} = -6x^2+6x+36=0$

$x^2-x-6=0$

$(x-3)(x+2)$

$x=3, -2$

$(3, 27)$

$(-2, -122)$

3. Find the zeros of $y = x^4 - 5x^3$ on $x \in [-1, 6]$. Show the algebraic work to support the zeros.

$$y = x^3(x-5)$$

$$x = 0, 5$$

$(0,0)$

$(5,0)$

4. Find the extreme points of $y = x^4 - 5x^3$ on $x \in [-1, 6]$. Show the derivative and algebra to support the critical values.

$$\frac{dy}{dx} = 4x^3 - 15x^2$$

$$= x^2 \cdot (4x - 15) = 0$$

$$x = 0, \ 15/4$$

BUT 0 IS NOT AN EXTREME

$(-1, 6)$

$(6, 216)$

$\left(\frac{15}{4}, -65.918\right)$

5. Use the equation of the line tangent to $y = 2x^3 - x^2 - 7x + 4$ at $x = 1$ to approximate $f(1.1)$

$y(1) = -2$

$\frac{dy}{dx} = 6x^2 - 2x - 7$

$m = -3$

$y + 2 = -3(x - 1)$

$f(1.1) \approx y = -3(1.1 - 1) - 2 = -2.3$

6. Evaluate the following limits:

a) $\lim_{x \to 5} \frac{x^2 - 6x + 5}{x^2 - 25} = \lim_{x \to 5} \frac{\cancel{(x-5)}(x-1)}{\cancel{(x-5)}(x+5)}$

$= \lim_{x \to 5} \frac{x-1}{x+5} = \frac{4}{10} = \frac{2}{5}$

b) $\lim_{x \to -2} \frac{x^3 + 8}{3x^3 + 6x^2 + x + 2} = \lim_{x \to -2} \frac{\cancel{(x+2)}(x^2 + 2x + 4)}{\cancel{(x+2)}(3x^2+1)}$

$$\begin{array}{r|rrrr} -2 & 3 & 6 & 1 & 2 \\ & & -6 & 0 & -2 \\ \hline & 3 & 0 & 1 & 0 \end{array}$$

$= \lim_{x \to -2} \frac{x^2 + 2x + 4}{3x^2 + 1} = \frac{4}{13}$

c) $\lim_{x \to 7} \frac{x^3 - 7x^2 - 3x + 21}{3x^3 - 20x^2 - 11x + 28} = \lim_{x \to 7} \frac{x^2\cancel{(x-7)} - 3\cancel{(x-7)}}{\cancel{(x-7)}(3x^2 + x - 4)} = \lim_{x \to 7} \frac{x^2 - 3}{3x^2 + x - 4}$

$$\begin{array}{r|rrrr} 7 & 3 & -20 & -11 & 28 \\ & & 21 & 7 & -28 \\ \hline & 3 & 1 & -4 & \end{array}$$

$= \frac{46}{150} = \frac{23}{75}$

PreCalculus Acc 18'-19' **Name:** Solution Key

Dr. Quattrin
Polynomial ReTest
NO CALCULATOR ALLOWED

7. Use the Power Rule to find:

a) Find $\frac{dy}{dx}$ if $y=-4x^3-5x^2+17x+37$

$\frac{dy}{dx}=-12x^2-10x+17$

b) Find $f'(x)$ if $f(x)=12x^4-6x^3+4x+7+\frac{1}{3x}$ $=\frac{1}{3}x^{-1}$

$f'=48x^3-18x^2+4-\frac{1}{3}x^{-2}$

c) $D_x\left[\sqrt[7]{x^4}-\frac{3}{\sqrt{x^3}}-\sqrt[4]{x}+8x-6\right]$ $=D_x\left[x^{4/7}-3x^{-3/2}-x^{1/4}+8x-6\right]$

$\frac{4}{7}x^{-3/7}+\frac{9}{2}x^{-5/2}-\frac{1}{4}x^{-3/4}+8$

7. Find the traits and **sketch** $y = -2x^3 + 3x^2 + 36x - \overset{54}{\cancel{48}}$.

Domain: ALL REALS

Range: ALL REALS

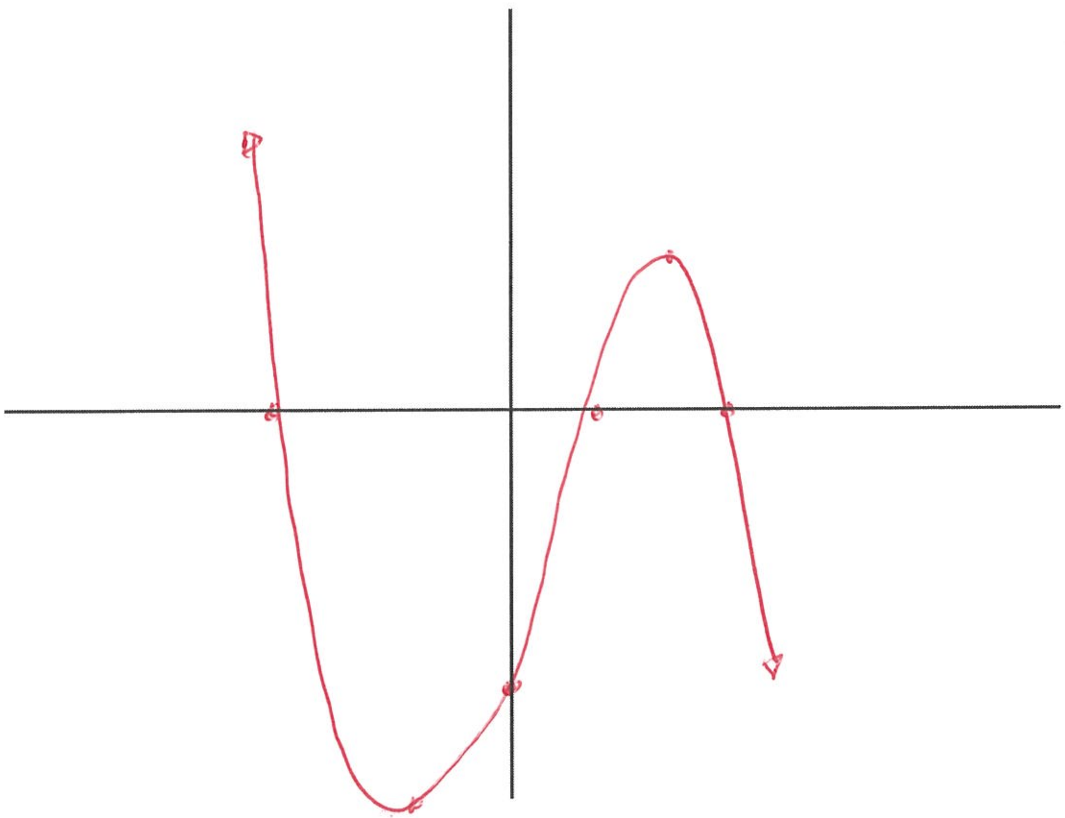
Zeros: SEE #1

y – intercept: (0, -54)

Extreme Points: SEE #2

End Behavior (Left): UP

End Behavior (Right): DOWN



8. Find the traits and **sketch** of $y = x^4 - 5x^3$ on $x \in [-1, 6]$.

Domain: $x \in [-1, 6]$

Range: $y \in [-65.918, 216]$

Zeros: SEE #3

y – intercept: $(0, 0)$

Extreme Points: SEE #4

End Behavior (Left): NONE

End Behavior (Right): NONE