

Precalculus '17-18
 PreCalc Basics Test
Round to 3 decimal places.
Show all work.

Name: SOLUTION KEY

score _____

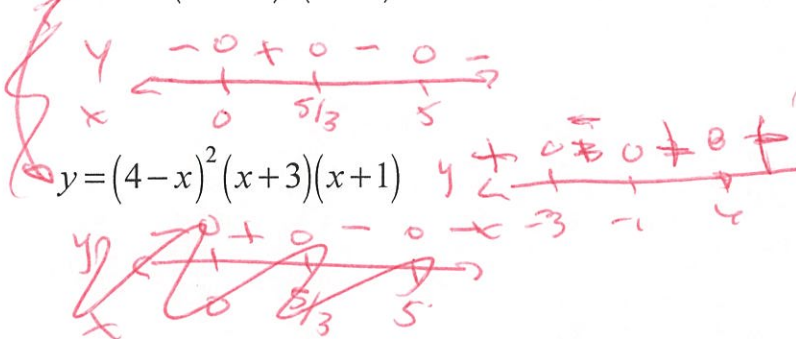
1. Find the equation of the line thru $(-3, 6)$ and $(-7, -1)$.

$$m = \frac{6 - (-1)}{-3 - (-7)} = \frac{7}{4}$$

$$y - 6 = \frac{7}{4}(x + 3)$$

2. Show the sign patterns for

$$y = -2x(3x - 5)^3(x - 5)^2$$



3. Find the zeros of $y = -3x^4 - 19x^3 - 25x^2 + 19x + 28$ by calculator and prove it by synthetic division.

$$\begin{array}{r} -4 \overline{) 3 \quad -19 \quad -25 \quad 19 \quad 28} \\ \underline{12 \quad 28 \quad -12 \quad -28} \\ -3 \quad -7 \quad 3 \quad 7 \end{array}$$

$$(x + 4) [-3x^3 - 7x^2 + 3x + 7]$$

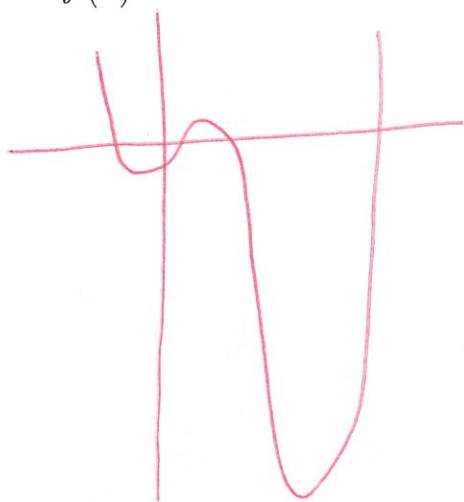
$$(x + 4) [-x^2(3x + 7) + 1(3x + 7)]$$

$$(x + 4)(1 - x^2)(3x + 7)$$

$$(x + 4)(1 - x)(1 + x)(3x + 7)$$

$$(-4, 0) (\pm 1, 0) \text{ and } (-7/3, 0)$$

4. Use your graphing calculator to find **and sketch** a complete graph of $f(x) = x^4 - 21x^3 + 43x^2 - 14x - 8$, draw it, and state the window used.



$$x \in [-5, 20] \quad y \in [-12000, 1200]$$

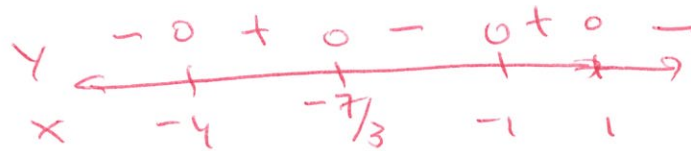
5. Use your graphing calculator to find the zeros and the extremes of $f(x) = x^4 - 21x^3 + 43x^2 - 14x - 8$.

$$\text{Zeros: } (-2.286, 0) (0.928, 0) (1.610, 0) (18.748, 0)$$

$$\text{EXT: } (0.189, -9.251) \\ (1.302, 3.189) \\ (14.259, -11007.92)$$

9. Show the sign pattern and solve $-3x^4 - 19x^3 - 25x^2 + 19x + 28 < 0$. (Note: This is the polynomial from #2 above)

$$(x+4)(1-x)(1+x)(3x+7)$$



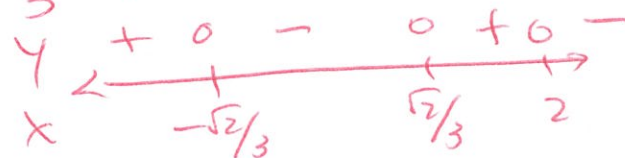
$$x \in (-\infty, -4) \cup (-\frac{7}{3}, -1) \cup (1, +\infty)$$

10. Show the sign pattern and solve $-9x^3 + 18x^2 + 4x - 8 > 0$

$$-9x^2(x-2) + 2(x-2)$$

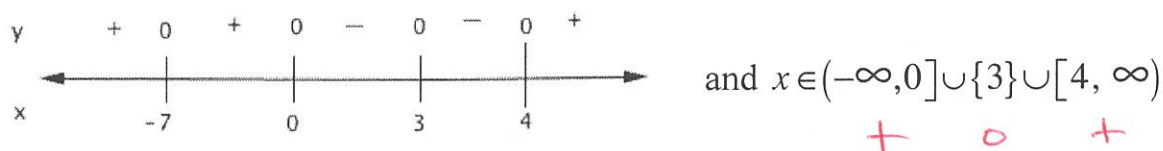
$$(2-9x^2)(x-2) > 0$$

$$x = \frac{\pm\sqrt{2}}{3}, 2$$



$$x \in (-\infty, -\frac{\sqrt{2}}{3}) \cup (\frac{\sqrt{2}}{3}, 2)$$

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



$$+(x+7)x(x-3)^2(x-4) \geq 0$$

7. Given this sign pattern $f(x)$ $\leftarrow \begin{array}{cccc} - & 0 & + & 0 & - & 0 & - \\ & -4 & & -1 & & 2 & \end{array} \rightarrow$, what **might** be the equation of $f(x)$?

$$y = -(x+4)(x+1)(x-2)^2$$

8. Simplify the following expression:

$$\begin{aligned} \text{a) } y = x^4 - 11x^2 + 18 &= (x^2 - 9)(x^2 - 2) \\ &= \cancel{(x^2 - 9)} (x-3)(x+3)(x-\sqrt{2})(x+\sqrt{2}) \end{aligned}$$

$$\begin{aligned} \text{b) } y = 3x^3 - 8x^2 - 15x + 40 &= x^2(3x-8) - 5(3x-8) \\ &= (x^2-5)(3x-8) \\ &= (x-\sqrt{5})(x+\sqrt{5})(3x-8) \end{aligned}$$