

Precalculus ACC '19-20
 PreCalc Basics Test
 Round to 3 decimal places.
 Show all work.

Name: Southern Key

score _____

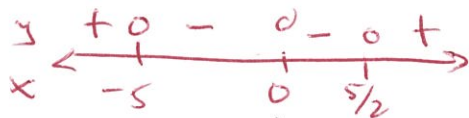
1. Find the equation of the line thru $(-1, 13)$ and $(-17, -21)$.

$$m = \frac{-21 - (13)}{-17 - (-1)} = \frac{-34}{-16} = +\frac{17}{8}$$

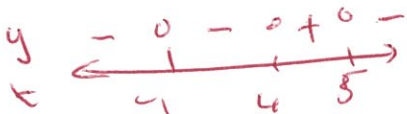
$$y - 13 = +\frac{17}{8}(x + 1)$$

2. Show the sign patterns for

$$y = x^4(2x - 5)^5(x + 5)^3$$



$$y = -4(x - 4)(x - 5)(x + 1)^2$$



3. Find the zeros of $y = -4x^4 + 21x^3 + 54x^2 - 189x - 162$ by calculator and prove it by synthetic division.

$$(x + 3)(x - 3)(x + 3/4)(-4)(x - 6)$$

$$(+3, 0)$$

$$(-3/4, 0)$$

$$(6, 0)$$

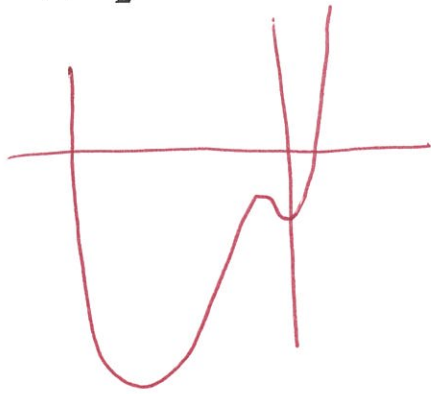
$$\begin{array}{r|rrrrrr} -3 & -4 & 21 & 54 & -189 & -162 & \\ & & 12 & -99 & +135 & +162 & \\ \hline & -4 & 33 & -45 & -64 & \emptyset & \end{array}$$

$$\begin{array}{r|rrrr} 3 & -4 & 33 & -45 & -64 \\ & & -12 & 63 & 64 \\ \hline & -4 & 21 & +18 & \emptyset \end{array}$$

$$\begin{array}{r|rrrr} -3/4 & -4 & 33 & -45 & -64 \\ & & 7.5 & -27 & 64 \\ \hline & -4 & 37.5 & -72 & \emptyset \end{array}$$

$$\begin{array}{r|rrrr} -3/4 & -4 & 21 & 18 \\ & & 3 & -18 \\ \hline & -4 & 24 & \emptyset \end{array}$$

4. Use your graphing calculator to find **and sketch** a complete graph of $f(x) = \frac{1}{2}x^4 + 9x^3 - 4x^2 - 8x - 3$, draw it, and state the window used.



$$x \in [-20, 5] \quad y \in [-6500, 600]$$

5. Use your graphing calculator to find the zeros and the extremes of $f(x) = \frac{1}{2}x^4 + 9x^3 - 4x^2 - 8x - 3$.

$$\text{Zeros: } (1.264, 0) \quad (-18.389, 0)$$

$$\text{mins: } (-13.769, -6173.492)$$

$$(2.690, -7.354)$$

$$\text{max: } (-.421, -.997)$$

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

$$f(x) \begin{array}{cccccc} + & 0 & - & 0 & + & 0 & - \\ \leftarrow & & & & & & \rightarrow \\ x & -5 & -1/3 & & 2 & & \end{array} \text{ and } x \in (-\infty, -5] \cup [-1/3, 2]$$

$$-(x+5)(3x+1)(x-2) \geq 0$$

7. Given this sign pattern $f(x) \begin{array}{cccccc} - & 0 & - & 0 & + & 0 & - \\ \leftarrow & & & & & & \rightarrow \\ x & -6/7 & & -0.1 & & 5 & \end{array}$, what **might** be the equation of $f(x)$?

$$y = (7x+6)^2 (10x+1)(x-5)$$

8. Show the sign pattern and solve $4x^4 - 21x^3 + 54x^2 - 189x - 162 > 0$. (Note: This is the polynomial from #2 above)

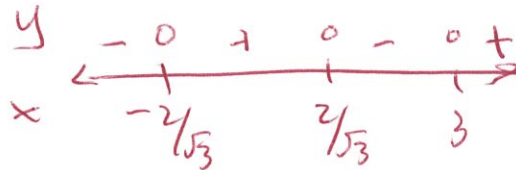
$$-4(x+3)(x-3)(x+3/4)(x-6) > 0$$

$$y \begin{array}{cccccc} - & + & 0 & - & 0 & + & 0 & - \\ \leftarrow & & & & & & & \rightarrow \\ x & -3 & -3/4 & & 3 & & 6 & \end{array}$$

$$x \in (-3, -3/4) \cup (3, 6)$$

9. Show the sign pattern and solve $3x^3 - 9x^2 - 4x + 12 \geq 0$

$$3x^2(x-3) - 4(x-3) > 0$$
$$(3x^2 - 4)(x-3) > 0$$



$$x \in \left[-\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}\right] \cup [3, \infty)$$

10. Factor:

a) $y = x^4 - 7x^2 + 12$

$$(x^2 - 3)(x^2 - 4)$$

$$(x - \sqrt{3})(x + \sqrt{3})(x - 2)(x + 2)$$

b) $y = x^3 - 7x^2 - 9x + 63$

$$x^2(x-7) - 9(x-7)$$

$$(x^2 - 9)(x - 7)$$

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