

Precalculus '13-14

PreCalc Basics

Round to 3 decimal places.

Show all work.

Name: SOLUTION KEY

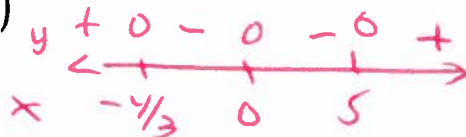
score \_\_\_\_\_

1. Find the equation of the line thru  $(-5, 6)$  and  $(-7, 6)$ .

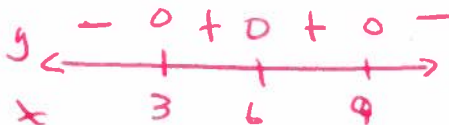
$$m = \frac{6-6}{-7-(-5)} = 0 \quad y = 6$$

2. Show the sign patterns for

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



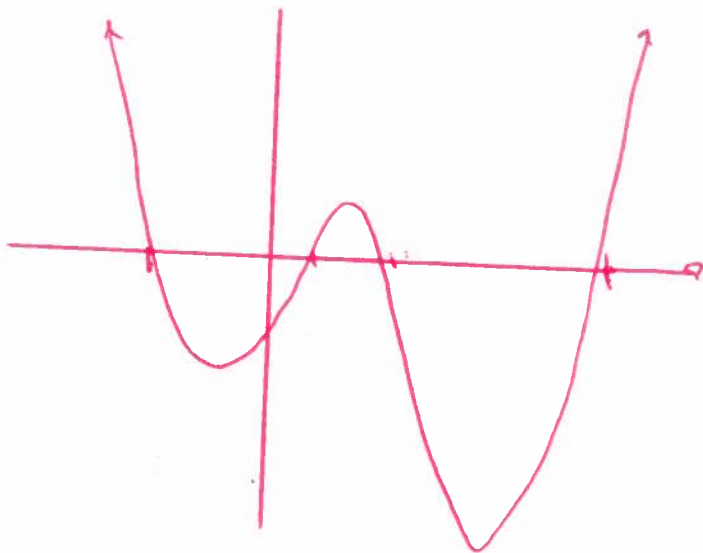
$$y = (3-x)(x-6)^2(x-9)$$



3. Find the zeros of  $y = 6x^4 - 5x^3 - 150x^2 + 125x$  by factoring.

$$\begin{aligned} &= x(6x^3 - 5x^2 - 150x + 125) \\ &= x(x^2(6x-5) - 25(6x-5)) \\ &= x(6x-5)(x^2-25) \\ &(0,0) \quad (4/5, 0) \quad (\pm 5, 0) \end{aligned}$$

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.



$$x \in [-5, 20]$$
$$y \in [-11, 100, 1000]$$

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

Zeros  $(.286, 0)$   $(.928, 0)$   $(1.610, 0)$   $(18.747, 0)$

Extremes  $(14.259, -11007.92)$   
 $(1.302, 3.189)$   
 $(.184, -9.251)$

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

$$\begin{array}{c}
 y \\
 x
 \end{array}
 \begin{array}{cccccc}
 & + & 0 & + & 0 & - & 0 & + \\
 \leftarrow & & -1 & & \frac{5}{3} & & 7 & \rightarrow
 \end{array}
 \text{ and } x \in (-\infty, 1), \left(-1, \frac{5}{3}\right), \text{ or } (7, \infty)$$

$$(x+1)^2 (3x-5) (x-7) > 0$$

7. Use synthetic division to find  $f\left(-\frac{3}{4}\right)$  if  $f(x) = 8x^4 - 6x^2 + 3$ .

$$\begin{array}{r|rrrrr}
 -\frac{3}{4} & 8 & 0 & -6 & 0 & 3 \\
 & & -6 & \frac{9}{2} & +9 & -\frac{27}{32} \\
 \hline
 & 8 & -6 & -\frac{3}{2} & \frac{9}{8} & \frac{69}{32}
 \end{array}$$

8. Simplify the following expression:

$$\begin{aligned}
 \text{(a)} \quad \frac{54-2x^3}{x^4-81} + \frac{6}{x^2+9} &= \frac{x(27-x^3)}{(x^2-9)(x^2+9)} \cdot \frac{x^2+9}{6} \\
 &= \frac{(3-x)(9+3x+x^2)}{3(x-3)(x+3)} = -\frac{9+3x+x^2}{3(x+3)}
 \end{aligned}$$

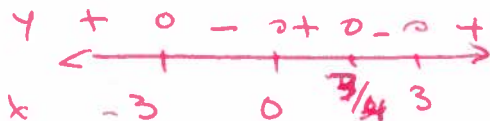
$$\text{(b)} \quad \frac{x^2+5x}{x^2+6x+5} + \frac{x^3}{3x+3} \cdot \frac{x}{x+1}$$

$$\frac{x(x+5)}{(x+5)(x+1)} \cdot \frac{3(x+1)}{x^2} \cdot \frac{x}{x+1} = \frac{3}{x(x+1)}$$

9. Show the sign pattern and solve  $4x^4 - 3x^3 - 36x^2 + 27x > 0$

$$x(4x^3 - 3x^2 - 36x + 27)$$

$$x(x-3)(x^2-9)$$



$$x \in (-\infty, -3) \cup (0, \frac{3}{4}) \cup (3, \infty)$$

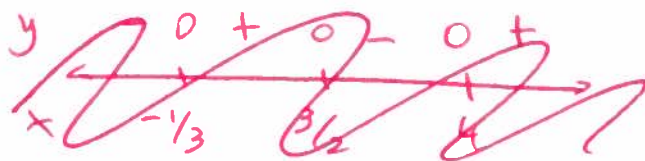
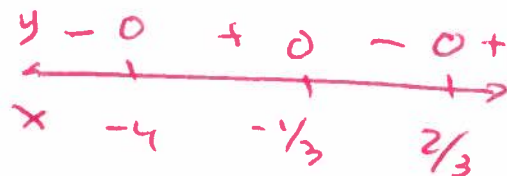
10. Show the sign pattern and solve  $6x^3 + 17x^2 - 31x - 12 \geq 0$

$$\begin{array}{r} -4 \overline{) 6 \quad 17 \quad -31 \quad -12} \\ \underline{-24 \quad +28 \quad 12} \\ 6 \quad -7 \quad -3 \end{array}$$

$$(x-4)(6x^2-7x-3)$$

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

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



$$x \in [-4, -\frac{1}{3}] \cup [\frac{2}{3}, \infty)$$

$$x \in [-\frac{1}{3}, \frac{3}{2}] \cup [4, \infty)$$