Precalculus ACC '18-19 Name: SOLUTION KEY

PreCalc Basics Test

Round to 3 decimal places. score 100

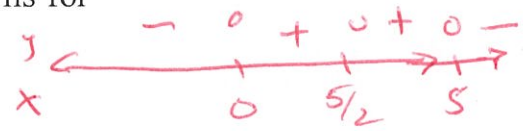
Show all work.

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

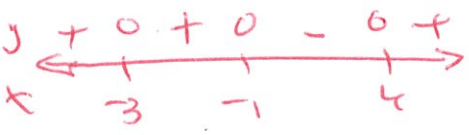
$m = \frac{6-(-1)}{-3-(-7)} = \frac{7}{4}$ $\quad y-6 = \frac{7}{4}(x+3)$

2. Show the sign patterns for

$y = -4x(2x-5)^6(x-5)^3$



$y = (x-4)(x+3)^2(x+1)$



3. Find the zeros of $y = -3x^4 - 11x^3 + 32x^2 + 44x - 80$ by calculator and prove it by synthetic division.

$$\begin{array}{r|rrrrr} -2 & -3 & -11 & 32 & 44 & -80 \\ & & 6 & 10 & -84 & 80 \\ \hline & -3 & -5 & 42 & -40 & 0 \end{array}$$

$$\begin{array}{r|rrrr} 2 & -3 & -5 & 42 & -40 \\ & & -6 & -22 & 40 \\ \hline & -3 & -11 & 20 & 0 \end{array}$$

$(x-2)(x+2)(-3x^2-11x+20)$

$(x-2)(x+2)(-3x+4)(x+5)$

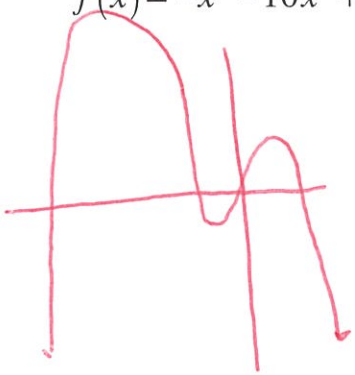
$(-2, 0)$

$(2, 0)$

$(-5, 0)$

$(+4/3, 0)$

4. Use your graphing calculator to find **and sketch** a complete graph of $f(x)=-x^4-10x^3+5x^2+12x+1$, draw it, and state the window used.



$x \in [-15, 4.7]$

$y \in [-100, 1300]$

Zeros: $(-10.371, 0)$ $(1.306, 0)$
$(-.848, 0)$
$(-.087, 0)$

Extremes: $(-7.772, 1255.712)$
$(-.5, -2.563)$
$(.772, 8.288)$

5. Use your graphing calculator to find the zeros and the extremes of $f(x)=-x^4-10x^3+5x^2+12x+1$.

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

$$\begin{array}{c} f(x) \\ x \end{array} \xleftarrow[-4 \quad -1.5 \quad 3]{+ \ 0 \ - \ 0 \ + \ 0 \ -} \text{ and } x \in [-4, -1.5] \cup [3, \infty)$$

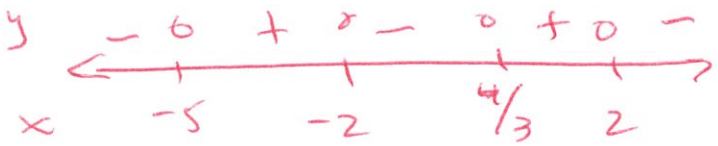
$-(x+4)(x+1.5)(x-3) \leq 0$

7. Given this sign pattern $\begin{array}{c} f(x) \\ x \end{array} \xleftarrow[-6 \quad -1 \quad 2]{+ \ 0 \ - \ 0 \ - \ 0 \ +}$, what **might** be the equation of $f(x)$?

$f(x) = + (x+6)(x+1)^2(x-2)$

8. Show the sign pattern and solve $-3x^4 - 11x^3 + 32x^2 + 44x - 80 < 0$. (Note: This is the polynomial from #2 above)

$(x-2)(x+2)(-3x+4)(x+5) \leq 0$

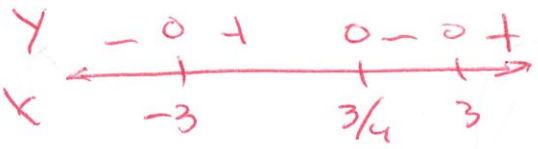


$x \in (-\infty, -5) \cup (-2, 4/3) \cup (2, \infty)$

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

$x^2(4x-3)-9(4x-3)\geq 0$

$(x^2-9)(4x-3)\geq 0$



$x\in[-3,\tfrac{3}{4}]\cup[3,\infty)$

10. Factor:

a) $y=x^4-2x^2-8$

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

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

b) $y=3x^3-9x^2-4x+12$

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

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

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