First Name: Last Name: KEY

Math 25 - Fall 2016

Quiz 3: Monday August 29, 2016

1. (3 points) Find the roots for the following polynomial:

$$f(x) = 2x^4 + 3x^3 - 15x^2 - 32x - 12$$

$\frac{p}{q} = \pm \frac{1,2,3,4,6,12}{1,2} = \pm(1,2,3,4,6,12,\frac{1}{2},\frac{3}{2})$

-2 | 2 3 −15 −32 −12

↓ −4 2 26 12

2 −1 −13 −6 | 0

$(x+2)(2x^3 - x^2 - 13x - 6)$

3 | 2 −1 −13 −6

↓ 6 15 6

2 5 2 | 0

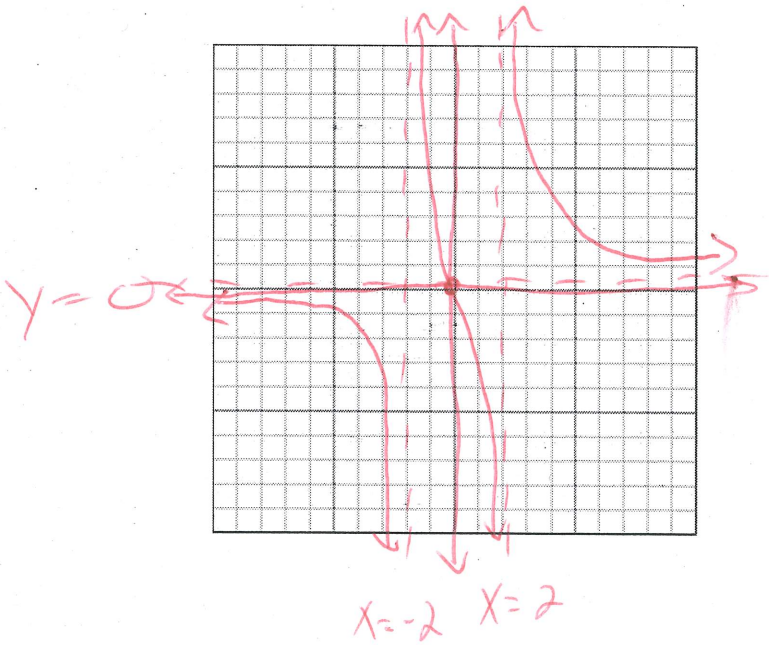
$(x+2)(x-3)(2x^2+5x+2)$

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

$x = -2, 3, -2, -\frac{1}{2}$

2. (3 points) Graph the following rational function:

$$f(x) = \frac{4x}{x^2 - 4}$$

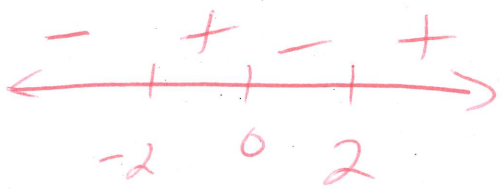


Zeros: $x = 0$

VA's: $x = \pm 2$

HA's $y = 0$

Sign chart



Please, show all work.

3. (3 points) Solve the following rational inequality and write the solution in interval notation.

$$f(x) = \frac{4x}{x^2 - 4} \qquad \frac{5-x}{x-1} \geq -2$$

$$\frac{5-x}{x-1} \geq -2 \iff \frac{5-x}{x-1} + 2 \geq 0$$

$$\iff \frac{5-x+2x-2}{x-1} \geq 0 \iff \frac{x+3}{x-1} \geq 0$$

$$+ \quad 2 \quad - \quad A \quad +$$

$$x=-3 \qquad x=1$$

$$(-\infty, -3] \cup (1, \infty)$$

4. (3 points) Compute the difference quotient for the following function and reduce completely.

$$f(x) = \frac{1}{x+1}$$

$$\frac{f(x+h)-f(x)}{h} = \frac{\frac{1}{x+h+1} - \frac{1}{x+1}}{h} = \frac{\frac{x+1-(x+h+1)}{x(x+h+1)}}{h}$$

$$= \frac{1}{h} \cdot \frac{x-x-h-1+1}{(1+x)(x+h+1)} = \frac{1}{h} \cdot \frac{-h}{(1+x)(x+h+1)}$$

$$= \boxed{\frac{-1}{(1+x)(x+h+1)}}$$

Please, show all work.