Written Homework #2. Math 1060 Due October 11, 2013

Name: Key Section: ____________

Remember to **show all work.**

1. Graph the rational function

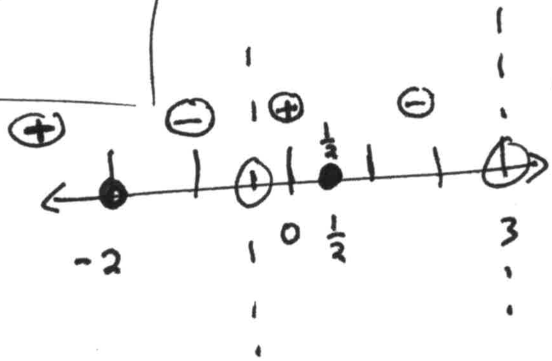
$$f(x) = \frac{(2x-1)(x+2)}{(3x+1)(x-3)} = \frac{2x^2+4x-x-2}{3x^2-9x+x-3}$$

leading terms of top & Bottom

(1) when x is big

$$f(x) \approx \frac{2x^2}{3x^2} = \frac{2}{3}$$

$\Rightarrow$ has a horizontal asymptote at $y = \frac{2}{3}$



(2) (A) $f(x) = 0$

$\Leftrightarrow$

$(2x-1)(x+2) = 0$

$\Leftrightarrow$

$x = \frac{1}{2}$ or $x = -2$

(x-intercepts)

(B) $f(x)$ undefined

$\Leftrightarrow$

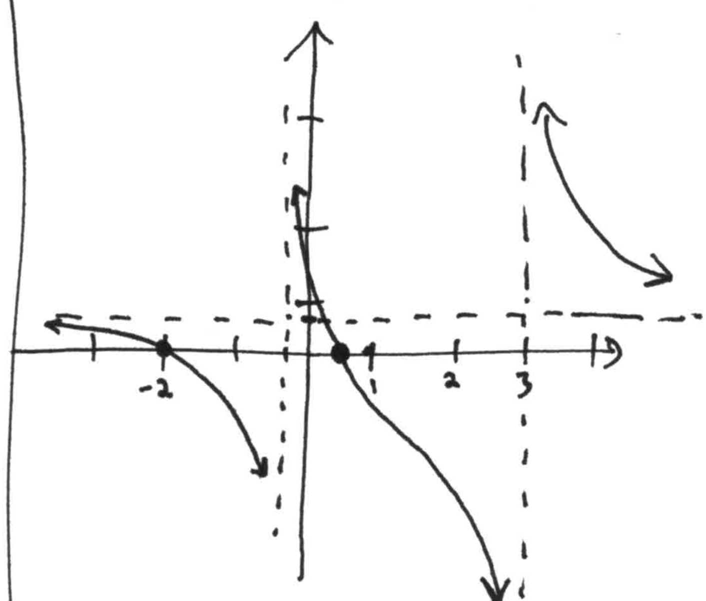
$(3x+1)(x-3) = 0$

$\Leftrightarrow$

$x = \frac{-1}{3}$ or $x = 3$

these are vertical asymptotes

Graphing Give:



(3) check intervals

$$f(-3) = \frac{(-6-1)(-3+2)}{(-9+1)(-3-3)} = \frac{(-7)(-1)}{(-8)(-6)} \quad ⊕$$

$$f(-1) = \frac{(-2-1)(-1+2)}{(-3+1)(-1-3)} = \frac{(-3)(1)}{(-2)(-4)} \quad ⊖$$

$$f(0) = \frac{(0-1)(0+2)}{(0+1)(0-3)} \quad ⊕$$

$$f(1) = \frac{(2-1)(1+2)}{(6+1)(1-3)} = \frac{(1)(3)}{(7)(-2)} \quad ⊖$$

$$f(4) = \frac{(8-1)(4+2)}{(12+1)(4-3)} = \quad ⊕$$

Name: ____________________ Section: ____________________

2. Find the quotient $Q(x)$ and the remainder $R(x)$ when the polynomial

$$2x^2 - 3x + 4$$

is divided by

$$x + 2$$

$$\begin{array}{r l}
 & 2x - 7 \\
x+2 \,\big) & 2x^2 - 3x + 4 \\
 & -(2x^2 + 4x) \downarrow \\
 & -7x + 4 \\
 & -(-7x - 14) \\
 & 0 \quad 18
\end{array}$$

$Q(x) = 2x - 7$

$R(x) = 28$

$Q = 2x - 7$

Answer: $R = 18$

3. Rewrite the following using polynomial long division:

$$\frac{3x^4 + 2x^3 - x + 2}{x^2 + 2x - 1}$$

$$\begin{array}{r l}
 & 3x^2 - 4x + 11 \\
x^2+2x-1 \,\big) & 3x^4 + 2x^3 + 0x^2 - x + 2 \\
 & -(3x^4 + 6x^3 - 3x^2) \\
 & -4x^3 + 3x^2 - x \\
 & -(-4x^3 - 8x^2 + 4x) \\
 & 0 \quad 11x^2 - 5x + 2 \\
 & -(11x^2 + 22x - 11) \\
 & -27x + 13
\end{array}$$

Answer: $3x^2 - 4x + 11 + \dfrac{-27x + 13}{x^2 + 2x - 1}$