Quiz Rational Functions 2015 version 1.doc **Name:**____________________________

1) Match each equation with its graph below.

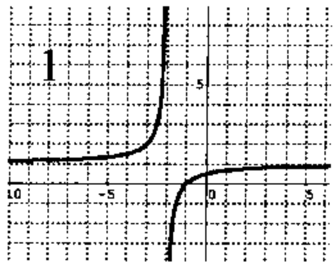
2 $f(x)=\dfrac{x^2+1}{x+2}$

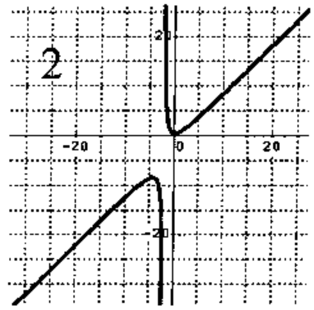
6 $g(x)=\dfrac{1}{x+2}$

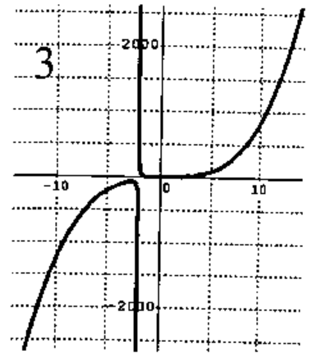
5 $h(x)=\dfrac{-x+1}{x+2}$

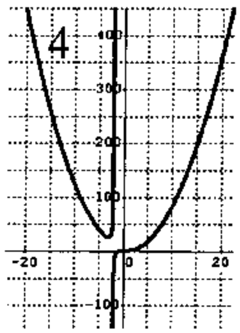
4 $j(x)=\dfrac{x^3+1}{x+2}$

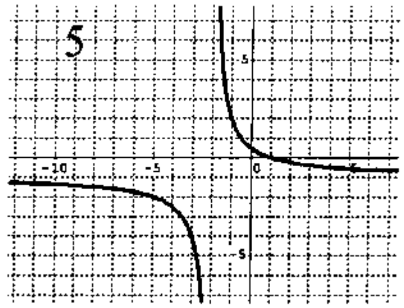
1 $k(x)=\dfrac{x+1}{x+2}$

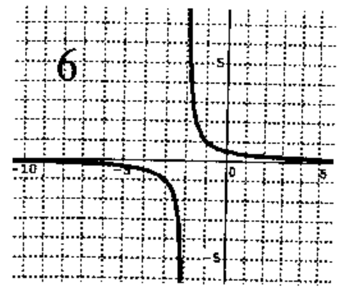












2) For the functions below find the x and y intercepts and vertical and horizontal asymptotes.

(a) $f(x)=\dfrac{4x^2-x}{2x^2+x-1}$ $x(4x-1)$ $x=0$ $x=\frac{1}{4}$

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

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

y-intercept(s): 0 x-intercept(s): 0, 1/4

Vertical asymptote(s): $x=$ −1, 1/2

Horizontal asymptote: $y=$ 2

(b) $f(x)=\dfrac{3x-4}{x^2+5x+4}$ $x=\frac{4}{3}$ $(x+4)(x+1)$

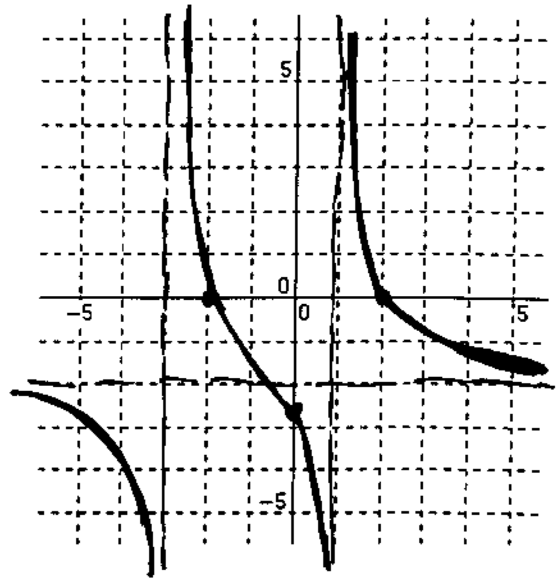
y-intercept(s): −1 x-intercept(s): $\frac{4}{3}$

Vertical asymptote(s): $x=$ −1, −4

Horizontal asymptote: $y=$ 0

3) Given the following information about a rational function, make a sketch of the function.

$$y=\frac{-2x^2+8}{x^2+2x-3}$$



y-intercept: $y=-\frac{8}{3}$

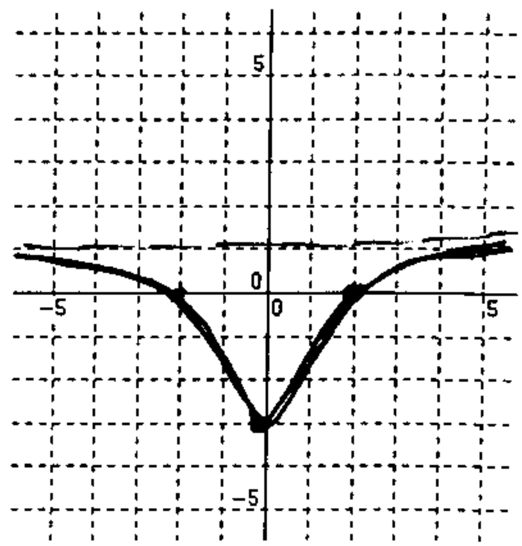
x-intercepts: $x=-2, x=2$

Vertical asymptotes: $x=-3, x=1$

Horizontal Asymptote: $y=-2$

4) Given the following information about a rational function, make a sketch of the function.

$$y=\frac{3x^2-12}{3x^2+4}$$



y-intercept: $y=-3$

x-intercepts: $x=-2, x=2$

Vertical asymptotes: *none*

Horizontal Asymptote: $y=1$

5) Find the equation of the slant asymptote of h(x).

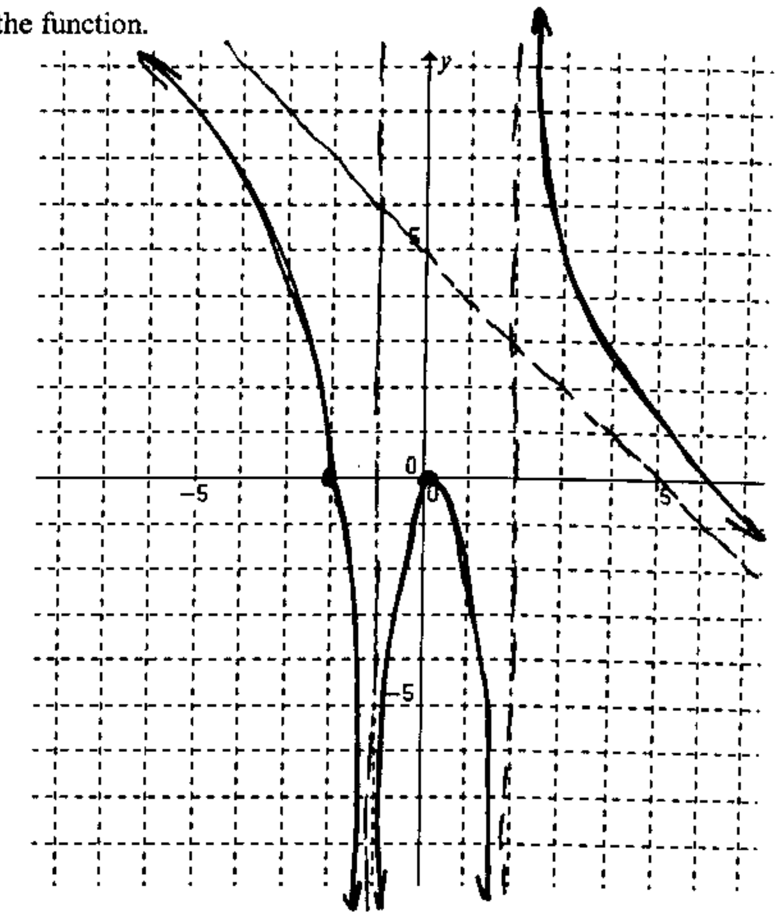
$$h(x)=\frac{6x^2-7x+5}{2x-1}$$

$$\begin{array}{r} 3x-2 \\ 2x-1\overline{)6x^2-7x+5} \\ -(6x^2-3x) \\ -4x+5 \\ -(-4x+2) \\ \hline 3 \end{array}$$

Slant asymptote: $y=$ $3x-2$

6) Fill in the following information and sketch the function.

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



y-intercept(s): $y=0$

x-intercept(s): $x=-2, x=0$

Vertical asymptote(s): $x=-1, x=2$

As $x\to\infty$, $f(x)\to$ $-\infty$

As $x\to-\infty$, $f(x)\to$ ∞

Horizontal or slant asymptote(s): $y=-x+5$

7) Determine the two missing terms in the unfinished long division of $f(x)=\dfrac{3x^4-8x^2+x-1}{x^2+2x}$ below.

$$\begin{array}{r l}
 & 3x^2 - 6x + 4 \\
x^2+2x \big) & 3x^4+0x^3-8x^2+x-1 \\
 & -(3x^4+6x^3) \\
\hline
 & -6x^3-8x^2+x-1 \\
 & -(-6x^3-12x^2) \\
\hline
 & 4x^2+x-1 \\
 & -(4x^2+8x) \\
\hline
 & -7x-1
\end{array}$$

8) Find a possible equation for the rational function graphed below.

$$y = \frac{3(x+3)(x-2)}{x(x+4)}$$

Vertical asym $x=-4, x=0$

Roots $x=2, x=-3$

9) Factor and determine the x-intercepts (or roots) of the following polynomial.

$f(x) = 10x^3 - 4x^2 - 6x$

$0 = 2x(5x^2 - 2x - 3)$

$0 = 2x(5x+3)(x-1)$

$\boxed{x=0,\ x=-\frac{3}{5},\ x=1}$

10) If you graph the rational function $f(x) = \dfrac{x^2-9}{x-3}$ you would expect to have a vertical asymptote at x = 3. But there is no asymptote! Instead there's just a tiny "hole" at x = 3. (See graph below.) **Why might that be?** Explain your thoughts using complete sentences.