Integrated Math 3. Chapter 9. Rational Functions Day 2 Homework Name:______________________

DIRECTIONS: For each function, name the x-coordinate of any discontinuities and tell if they are removable (hole in the graph) or infinite (vertical asymptote). Also, use end behavior to determine any horizontal asymptotes.

1) $f(x) = \frac{x-9}{2x-6} = \frac{x-9}{2(x-3)}$

Location of discontinuity: x=3

Type of discontinuity: vertical asymptote

x	-1,000,000,000	-1,000,000	1,000,000	1,000,000,000
f(x)	0.500	0.500	.4999	.49999

$\lim_{x\to\infty} f(x) =$ 0.5

Horizontal Asymptote: y=0.5

$\lim_{x\to-\infty} f(x) =$ 0.5

2) $f(x) = \frac{6x^2}{2x^2-8} = \frac{6x^2}{2(x^2-4)} = \frac{6x^2}{2(x-2)(x+2)}$

Locations of discontinuities: x=2 , x=-2

Type of discontinuities: vertical asymptotes

x	-1,000,000,000	-1,000,000	1,000,000	1,000,000,000
f(x)	3	3	3	3

$\lim_{x\to\infty} f(x) =$ 3

Horizontal Asymptote: y=3

$\lim_{x\to-\infty} f(x) =$ 3

3) $f(x) = \frac{1}{x+6}$

Location of discontinuity: $x = -6$

Type of discontinuity: vertical asymptote

x	-1,000,000,000	-1,000,000	1,000,000	1,000,000,000
f(x)	-1.00×10^{-9}	-1.00×10^{-6}	$9.999.. \times 10^{-7}$	$9.99... \times 10^{-10}$

$\lim_{x \to \infty} f(x) =$ 0

Horizontal Asymptote: $y = 0$

$\lim_{x \to -\infty} f(x) =$ 0

4) $f(x) = \frac{x^2+2x-8}{4x-3}$ $\frac{(x+4)(x-2)}{(4x-3)}$

Location of discontinuity: $x = 3/4$

Type of discontinuity: vertical asymptote

x	-1,000,000,000	-1,000,000	1,000,000	1,000,000,000
f(x)	$-2.499.. \times 10^{8}$	-2.49×10^{5}	2.5×10^{5}	2.5×10^{8}

$\lim_{x \to \infty} f(x) = \infty$

Horizontal Asymptote: none

$\lim_{x \to -\infty} f(x) = -\infty$

***Do you think you can come up with the end behavior for rational functions just by looking at the equation?