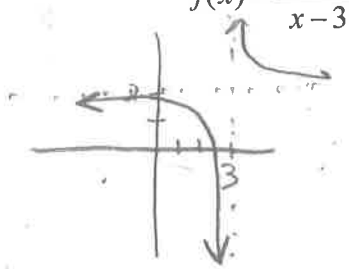
Key

Math 4 Name______________________________

Unit 3 Review Date__________

1. Use limit notation to describe the behavior of $j(x)$ near its vertical and horizontal asymptotes. It would also be nice if you could draw a sketch of the function as well.

$j(x)=\dfrac{2x+5}{x-3}$



Horizontal (end behavior): $\lim\limits_{x\to-\infty} j(x)=2$ | $\lim\limits_{x\to\infty} j(x)=2$

vertical: $\lim\limits_{x\to3^-} j(x)=-\infty$ | $\lim\limits_{x\to3^+} j(x)=\infty$

2. Add, subtract, multiply or divide the rational expressions below. Simplify your answer.

a. $\dfrac{x^2-x-6}{2x^2+9x+4}\cdot\dfrac{x^2-16}{2x^2-7x-4}$

$=\dfrac{(x-3)(x+2)}{(2x+1)\cancel{(x+4)}}\cdot\dfrac{\cancel{(x+4)}\cancel{(x-4)}}{(2x+1)\cancel{(x-4)}}$

$=\boxed{\dfrac{(x-3)(x+2)}{(2x+1)^2}}$

b. $\dfrac{3x-4}{2x^2+3x+1}+\dfrac{5}{2x+1}\cdot\dfrac{(x+1)}{(x+1)}$

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

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

$=\dfrac{3x-4+5x+5}{(2x+1)(x+1)}=\boxed{\dfrac{8x+1}{(2x+1)(x+1)}}$

c. $\dfrac{2(x+3)^2}{x-3}\div\dfrac{4}{x^2-9}$

$=\dfrac{\cancel{2}^{1}(x+3)^2}{\cancel{x-3}}\cdot\dfrac{(x+3)\cancel{(x-3)}}{\cancel{4}\,2}$

$=\boxed{\dfrac{(x+3)^3}{2}}$

d. $\dfrac{6x+5}{2x+3}-\dfrac{2x-1}{2x+3}$

$=\dfrac{6x+5-2x+1}{2x+3}$

$=\dfrac{4x+6}{2x+3}$

$=\dfrac{2(2x+3)}{2x+3}$

$=\boxed{2}$

Determine the values of the properties below. Write "none" if one does not exist.

3. $f(x)=\dfrac{(2x-3)\cancel{(x+5)}}{x^2+6x+5} = \dfrac{2x-3}{x+1}$

$\cancel{(x+5)}(x+1)$

4. $w(x)=\dfrac{2x^2-13x-45}{3x^3+28x+9x} = \dfrac{(2x+5)(x-9)}{x(3x+1)(x+9)}$

$x(3x^2+28x+9)$

Domain: $\{x : x \neq -5, x \neq -1\}$

x-intercept(s): $(\frac{3}{2}, 0)$

y-intercept: $(0, -3)$

horizontal asymptote(s): $y=2$

vertical asymptote(s): $x=-1$

oblique asymptote: None

hole: $(-5, \frac{13}{4})$

$f(-5)=\dfrac{2(-5)-3}{(-5)+1} = \dfrac{-13}{-4} = \dfrac{13}{4}$

Domain: $\{x : x \neq 0, -\frac{1}{3}, -9\}$

x-intercept(s): $(-\frac{5}{2}, 0)$ + $(9, 0)$

y-intercept: None → If $x=0$, denominator $=0$ BAD!

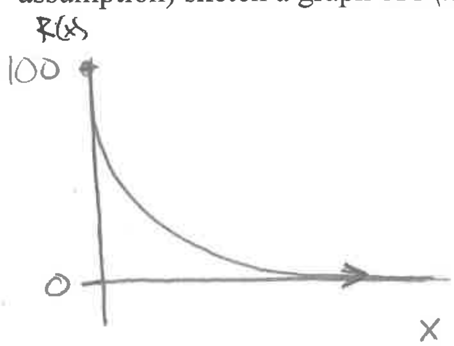
horizontal asymptote(s): $y=0$

vertical asymptote(s): $x=0$, $x=-\frac{1}{3}$, $x=-9$

oblique asymptote: None

hole: None

5. The function *R(x)* models the percentage of RC Cola in a glass as a function of the number of ice cubes in the glass. Assuming you can put an infinite number of ice cubes in the glass (bad assumption) sketch a graph of *R(x)* and use the appropriate limit notation to describe your graph.



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

and

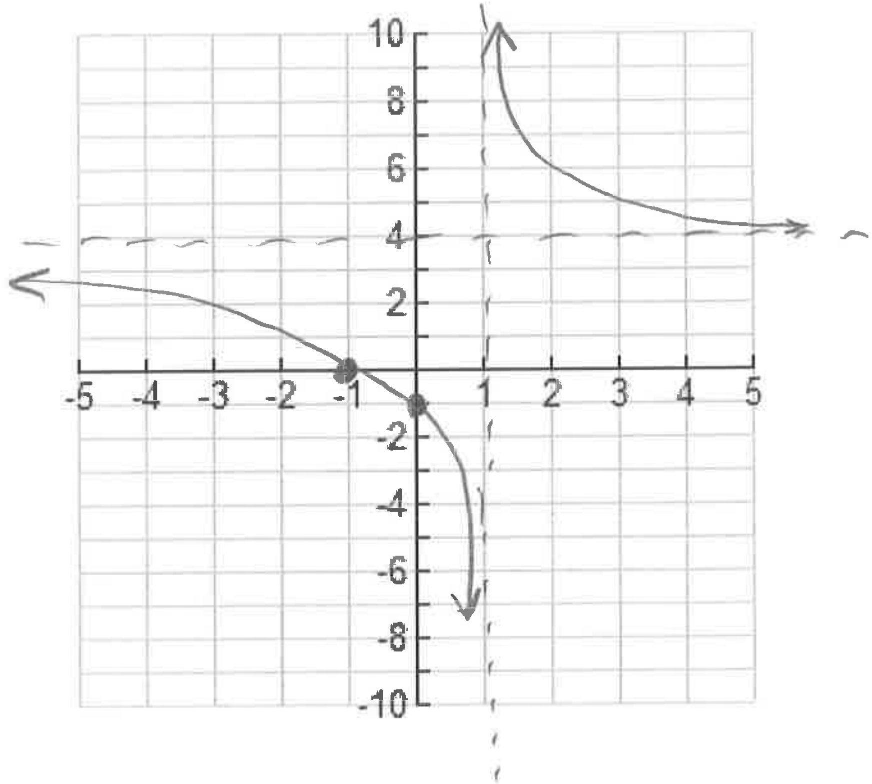
$\lim_{x\to 0^+} R(x) = 100$

6. On the graph below, sketch a possible graph of the function *f(x)* with the following characteristics:

$\lim_{x\to\infty} f(x) = 4, \lim_{x\to-\infty} f(x) = 4$

$\lim_{x\to1^-} f(x) = -\infty, \lim_{x\to1^+} f(x) = \infty$

$f(-1) = 0, f(0) = -1$



*****Redo all the problems from any Unit 3 sheets/packets. Also, look over your last quiz!**