Name _____ Pd _____

Homework Topic 1.9-1.10: Rational Functions

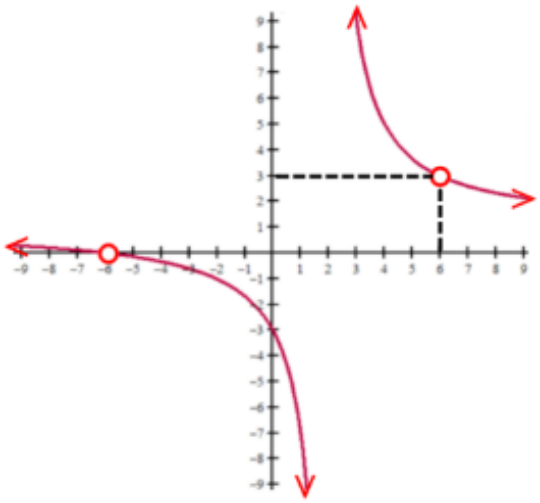
Directions: Write the limit notation for any vertical asymptotes or holes in the following graphs.

1.

Limit Notation Hole(s):

Limit Notation Vertical Asymptote(s):

2.



Limit Notation Hole(s):

Limit Notation Vertical Asymptote(s):

Directions: For each of the following, write the left and right limit statements for *f(x)* as *x* approaches 3.

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

Left:

Right:

4. $f(x)=\dfrac{(x-3)(x+3)}{x(x-3)}$

Left:

Right:

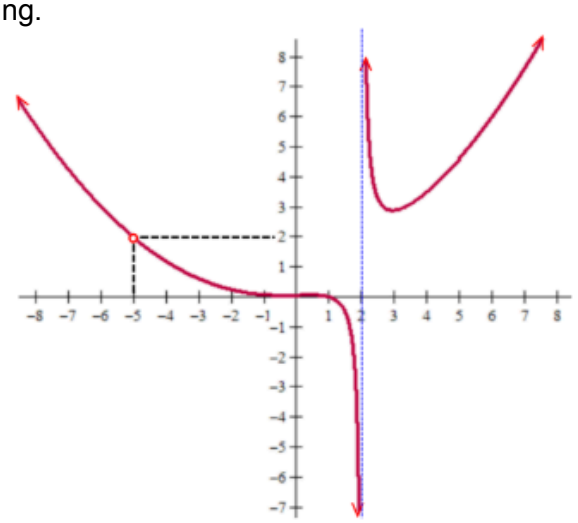
5. $f(x)=\dfrac{-2}{(x-3)^2}$

Left:

Right

Directions: Use the graph of the rational function *f* to find the following.

6.



a. $f(6) =$

b. $f(2) =$

c. $\lim_{x\to -5^-} f(x) =$

d. $\lim_{x\to -5^+} f(x) =$

e. $\lim_{x\to 2^-} f(x) =$

f. $\lim_{x\to 2^+} f(x) =$

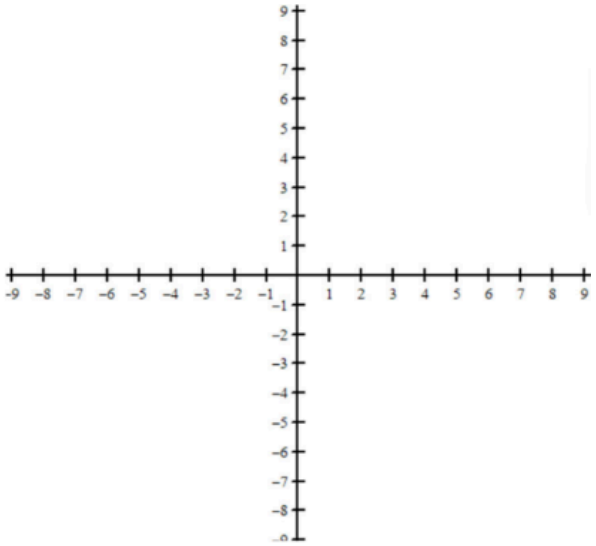
e. $\lim_{x\to -\infty} f(x) =$

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

i. Domain =

Directions: Make a sketch of a rational function with the following characteristics.

7. The graph of f has…



a. $f(-4) = 0$

b. $f(6) = 0$

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

d. $\lim_{x\to -3^+} f(x) = \infty$

e. $\lim_{x\to 4^-} f(x) = \infty$

f. $\lim_{x\to 4^+} f(x) = -\infty$

g. $\lim_{x\to -\infty} f(x) = 2$

h. $\lim_{x\to \infty} f(x) = 2$

i. $f(0) = 5$

Directions: Write an equation of a rational function that has the following properties.

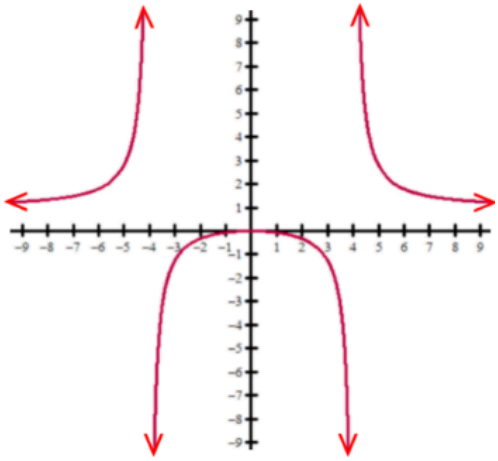
8. The graph of f has a hole at $x = 3$ and vertical asymptotes at $x = 1$ and $x = -4$.

The graph of g has a hole at $x = -1$, a vertical asymptote at $x = 7$, and a zero at $x = -2$.

The graph of h has a hole at $x = 2$ and $x = 5$, a vertical asymptote at $x = 0$, and a zero at $x = 1$.

Directions: Answer the following multiple choice questions.

9. Given the graph of f. Which of the following describes the function f?



(A) $\lim_{x\to -4^-} f(x) = -\infty$ and $\lim_{x\to -4^+} f(x) = -\infty$

(B) $\lim_{x\to -4^-} f(x) = \infty$ and $\lim_{x\to -4^+} f(x) = -\infty$

(C) $\lim_{x\to -4^-} f(x) = -\infty$ and $\lim_{x\to -4^+} f(x) = \infty$

(D) $\lim_{x\to -4^-} f(x) = \infty$ and $\lim_{x\to -4^+} f(x) = \infty$

(E) $\lim_{x\to -4} f(x) = f(0)$

10. Which of the following statements about the graph of the rational function $y = \dfrac{(x-2)^2(x+3)(x-5)^6}{(x-2)^3(x+3)(x-5)^2}$ is correct?

(A) The graph has three vertical asymptotes and no holes.

(B) The graph has two vertical asymptotes and one hole.

(C) The graph has one vertical asymptote and two holes.

(D) The graph has no vertical asymptotes and three holes.

Directions: Answer the following free response question.

11. The function f is a rational function graphed in the xy-plane. The polynomial in the numerator of f has exactly one real zero at $x = 3$. The polynomial of the denominator of f has exactly two real zeros at both $x = 3$ and $x = 6$. The multiplicities of the zeros at $x = 3$ in the numerator and in the denominator are equal.

a. Find the domain for the graph of f.

b. Describe any holes and/or vertical asymptotes for the graph of f.

c. Explain how your answer from part b would change if the multiplicities of the zeros at $x = 3$ in the numerator and denominator were not equal?