Rational Functions Review

Name_____

1) The mass m in kilograms of a bronze statue varies directly as its volume V in cubic centimeters. If a statue made from 1000 cm^3 of bronze has a mass of 8.7 kg, what is the mass of a statue made from 4500 cm^3 of bronze?

2) The time t in hours needed to clean the rides at an amusement park varies inversely with the number of workers n. If 6 workers can clean the rides in 6 hours, how many hours will it take 10 workers to clean the rides?

3) Determine whether the data set represents a direct variation or inverse variation, determine the constant coefficient and the equation for this set.

x	2	5	10
y	25	10	5

Identify any places of discontinuity for each rational function (i.e. holes and vertical asymptotes).

4) $f(x) = \dfrac{2x^3 - 18x}{x^2 + 3x - 18}$

5) $f(x) = \dfrac{x^2 + x - 12}{x^2 - 16}$

Identify all asymptotes (vertical, horizontal, oblique) of the following functions.

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

7) $f(x) = \dfrac{x^2 - 2x - 3}{3x^2 - 3x}$
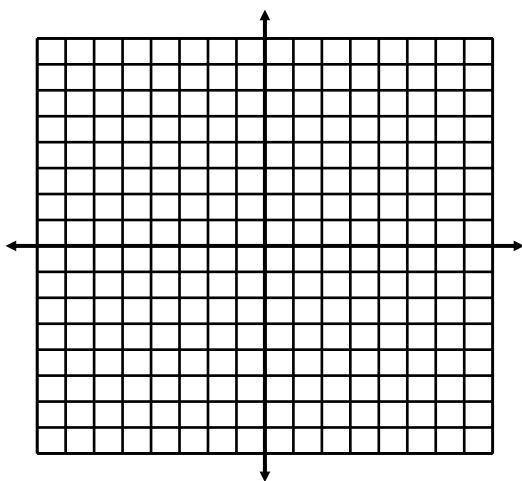
8) $f(x) = \dfrac{-3x^2 + 2}{x - 1}$

Find the zeros of the following functions.

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

10) $f(x) = \dfrac{x^2 - x}{x^2 - 25}$

Identify the following attributes of each function. Then graph.

11) $g(x) = \dfrac{-3}{x+5}$

Vertical asymptote(s):_____

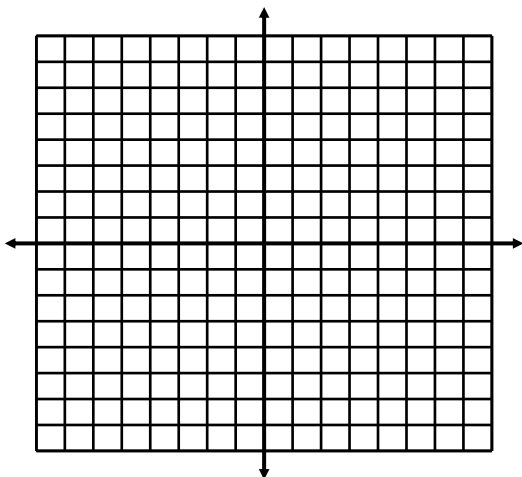Horizontal asymptote(s):_____

Domain:_____

Range:_____

Holes:_____

Zeros:_____

Y-Int:_____

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

Vertical asymptote(s):_____

Horizontal asymptote(s):_____

Domain:_____

Range:_____

Holes:_____

Zeros:_____

Y-Int:_____

Write the equation of a rational function with the given characteristics:

13) zero at 0, vertical asymptotes as $x = -3$ and $x = 3$, and holes at $x = -1$ and $x = 1$

14) zero at $x = 3$, vertical asymptotes at $x = 7$ and $x = 2$, and a horizontal asymptote at $y = 1$

Solve. Identify any extraneous solutions.

15) $\dfrac{x^2 + 3x - 10}{x - 2} = 7$

16) $\dfrac{3}{x^2 - 9} + \dfrac{5}{x + 3} = \dfrac{10}{x + 3}$

Solve each rational inequality. Write the solution using interval notation.

17) $\dfrac{x + 4}{x} > -2$

18) $\dfrac{2}{x - 3} < 4$

Multiply or divide. Assume that all expressions are defined.

19) $\dfrac{x+3}{x+2} \bullet \dfrac{2x-4}{x^2-9}$

20) $\dfrac{3x^2+6x-24}{x^2-x-20} \div \dfrac{3x^3-9x^2+6x}{x}$

Add or subtract. Identify any x-values for which the expression is undefined.

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

22) $\dfrac{3x}{x^2-x-6} - \dfrac{5}{x^2-8x+15}$

Solve each rational "work" problem.

23) Suppose one painter can paint an entire house in twelve hours and a second painter takes 8 hours to complete the same house. How long would it take the two painters if they worked together?

24) A kayaker spends an afternoon paddling on a river. She travels 3 miles upstream and 3 miles downstream in a total of 4 hours. In still water, the kayaker can travel an average speed of 2 miles/hour. Based on this information, what is the average speed of the river's current?