College Algebra Worksheet (8)
Multiple Choice Questions on Rational Functions

1. Find the function $f$ whose graph is given below.

   a. $f(x) = \frac{(x - 1)(x - 3)}{(x - 2)^2}$
   
   b. $f(x) = \frac{2(x - 1)(x - 3)}{(x - 2)}$

   c. $f(x) = \frac{2(x - 1)(x - 3)}{(x - 2)^3}$

   d. $f(x) = \frac{2(x - 1)(x - 3)}{(x - 2)^2}$
2. If function $f$ is defined by $f(x) = \frac{4x^2 - 12x}{x^2 - 9}$, then at $x = 3$

a. the graph of $f$ has a vertical asymptote.

b. the graph of $f$ has a hole on the x axis.

c. $f(x) = 0$

d. the graph of $f$ has a hole at $(3, 2)$.

3. Which of the following functions has an oblique asymptote?

a. $f(x) = \frac{x^5 + 1}{x^4 + 3x^2 + 2}$

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

c. $f(x) = \frac{4x^2 + x + 1}{x^2}$

d. $f(x) = \frac{x^5}{x^2 - 1}$

4. Find the equation of the oblique asymptote of the function $f(x) = \frac{x^2 - 11x + 30}{x - 4}$

a. $y = x - 4$

b. $y = x + 4$

c. $y = x - 7$

d. $y = x + 7$
5. Find the function \( f \) whose graph is given below.

   a. \( f(x) = \frac{x-2}{x^2+3x-4} \)
   
   b. \( f(x) = \frac{2-x}{x^2+3x-4} \)
   
   c. \( f(x) = \frac{x-2}{x^2-3x-4} \)
   
   d. \( f(x) = \frac{2-x}{x^2-3x-4} \)

6. Which of the following functions has no horizontal asymptote?

   a. \( f(x) = \frac{x^2-2}{x^3-9x-4} \)
   
   b. \( f(x) = \frac{5x^4-2^3-x+7}{-x^3+3x^2-4} \)
   
   c. \( f(x) = \frac{9x^2-2x-3}{x^2+8x-2} \)
   
   d. \( f(x) = \frac{1}{x^2-x} \)
7. Which of the following functions has a hole at (1,4)?

a. \( f(x) = \frac{x - 1}{(x - 1)(x - 5)} \)

b. \( f(x) = \frac{x - 1}{(x + 1)^2} \)

c. \( f(x) = \frac{4}{x - 1} \)

d. \( f(x) = \frac{(x - 1)(11x + 1)}{(x - 1)(x + 2)} \)

8. Which of the following functions has a zero, a vertical asymptote and a horizontal asymptote?

a. \( f(x) = \frac{x - 4}{(x - 4)(x - 5)} \)

b. \( f(x) = \frac{(x + 2)(x^2 + 1)}{(x - 4)(x^2 + 7)} \)

c. \( f(x) = \frac{x^2 + 5}{(x - 4)(x - 5)} \)

d. \( f(x) = \frac{(x - 5)(x^2 + 8)}{(x - 4)} \)

9. Which of these functions has no vertical asymptotes?

a. \( f(x) = \frac{x - 7}{(x - 7)(x - 5)} \)

b. \( f(x) = \frac{x}{x^2 - x - 1} \)

c. \( f(x) = \frac{1}{x - 2} \)

d. \( f(x) = \frac{x^2 - 9x + 20}{(x - 4)(x - 5)} \)

10. Which of the following functions has a hole, one zero, an oblique asymptote and no vertical asymptote?

a. \( f(x) = \frac{(x - 7)(x^2 + 1)}{(x - 7)(x - 5)} \)

b. \( f(x) = \frac{(x - 7)(x^2 - 1)}{(x - 7)(x - 2)} \)

c. \( f(x) = \frac{(x - 7)(x^3 - 4)}{(x - 7)(x^2 + 5)} \)

d. \( f(x) = \frac{x - 7}{(x - 7)(x - 5)} \)