Rational Functions and Their Graphs

1. Find the domain of each rational function

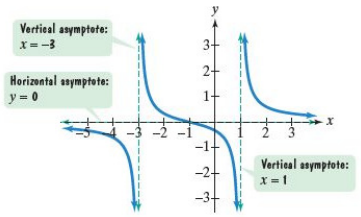
$$h(x) = \frac{x-5}{x^2-25}$$

2. Find the domain of each rational function

$$f(x) = \frac{x+3}{x^2+9}$$

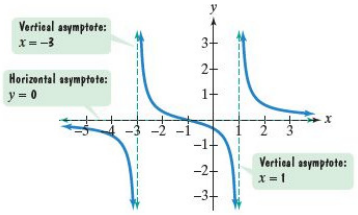
3. Use the graph to complete the statement:

$As \quad x \to -3^+, \quad f(x) \to$ _____



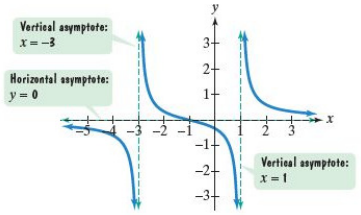
4. Use the graph to complete the statement:

$As \quad x \to 1^+, \quad f(x) \to$ _____



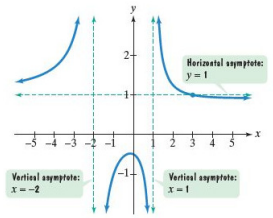
5. Use the graph to complete the statement:

$As \quad x \to \infty, \quad f(x) \to$ _____



6. Use the graph to complete the statement:

$As \quad x \to 1^{-}, \quad f(x) \to$ _____



7. Find the vertical asymptotes, if any, of the graph of each rational function.

$$g(x) = \frac{x-5}{x(x+5)}$$

8. Find the vertical asymptotes, if any, of the graph of each rational function.

$$g(x) = \frac{x-4}{(x-4)(x-5)}$$

9. Find the horizontal asymptotes, if any, of the graph of each rational function.

$$f(x) = \frac{8x}{5x^2 - 3x + 1}$$

10. Find the horizontal asymptotes, if any, of the graph of each rational function.

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

11. Find the horizontal asymptotes, if any, of the graph of each rational function.

$$h(x) = \frac{10x^3}{4x^2 - x}$$

12. Find the horizontal asymptotes, if any, of the graph of each rational function.

$$f(x)=\frac{-4x+2}{7x-1}$$

13. Describe the transformation of

$$f(x)=\frac{1}{x} \quad or \quad f(x)=\frac{1}{x^2}$$

to the following function:

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

14. Describe the transformation of

$$f(x)=\frac{1}{x} \quad or \quad f(x)=\frac{1}{x^2}$$

to the following function:

$$g(x)=\frac{1}{x-4}-3$$

15. Describe the transformation of

$$f(x)=\frac{1}{x} \quad or \quad f(x)=\frac{1}{x^2}$$

to the following function:

$$h(x)=\frac{1}{(x-1)^2}-2$$

16. Graph each rational function.

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

17. Graph each rational function.

$$f(x)=\frac{x-3}{x^2-6x+8}$$

18. a. Find the slant asymptote and b. graph each rational function.

$$f(x) = \frac{x^2 + 4x - 7}{x - 2}$$

19. a. Find the slant asymptote and b. graph each rational function.

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