Practice 02
3.5 Rational Functions
3.6 Polynomial and Rational Inequalities

Write the domain in interval notation.

1) $f(x) = \dfrac{x^2 - 81}{x + 9}$ 1) _____

A) $(-\infty, -9] \cup [-9, \infty)$ B) $(-\infty, -9) \cup (-9, \infty)$

2) $f(x) = \dfrac{7x - 1}{4x^2 - 27x - 81}$ 2) _____

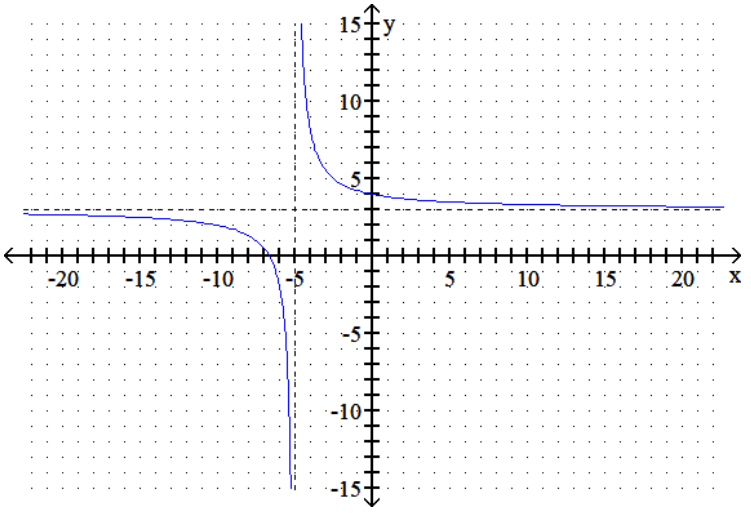
A) $\left(-\infty, -9\right) \cup \left(-9, -\dfrac{9}{4}\right] \cup \left[\dfrac{9}{4}, \infty\right)$ B) $\left(-\infty, -\dfrac{9}{4}\right) \cup \left(-\dfrac{9}{4}, 9\right) \cup (9, \infty)$

3) $f(x) = \dfrac{16x}{x^2 + 100}$ 3) _____

A) $(-\infty, -10) \cup (-10, 10) \cup (10, \infty)$ B) $(-\infty, \infty)$

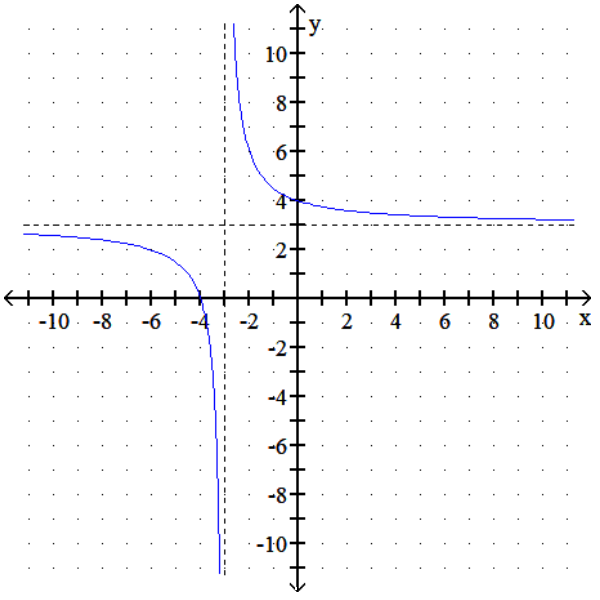
Refer to the graph of the function and complete the statements.

4) As $x \to -\infty, f(x) \to$ _____. 4) _____
As $x \to \infty, f(x) \to$ _____.



A) ∞; $-\infty$ B) 3; 3

5) The graph is increasing over the interval(s) _____. 5) _____
The graph is decreasing over the interval(s) _____.



A) $(-\infty, -3) \cup (-3, \infty)$;
Never decreasing

B) Never increasing;
$(-\infty, -3) \cup (-3, \infty)$

Determine the vertical asymptote(s) of the graph of the function.

6) $h(x) = \dfrac{x + 4}{2x^2 + 11x + 5}$ 6) _____

A) $x = -\dfrac{1}{2}$ and $x = -5$

B) $x = 4$ and $x = 5$

a. Identify the horizontal asymptote (if any).
b. If the graph of the function has a horizontal asymptote, determine the point where the graph crosses the horizontal asymptote.

7) $f(x) = \dfrac{2x^2 + 2x - 5}{x^2 + 2}$ 7) _____

A) **a.** $y = 0$
b. $\left(-\dfrac{5}{2}, 0\right)$

B) **a.** $y = 2$
b. $\left(\dfrac{9}{2}, 2\right)$

C) **a.** $y = 0$
b. Graph does not cross $y = 0$.

D) **a.** No horizontal asymptote
b. Not applicable

8) $s(x) = \dfrac{5x - 10}{x^2 + 5x - 4}$ 8) _____

A) **a.** $y = 0$
b. $(2, 0)$

B) **a.** No horizontal asymptote
b. Not applicable

9) $f(x) = \dfrac{x^2 - 7x^2 + 1}{8x + 7}$ 9) _____

A) **a.** $y = 0$
b. $\left(\dfrac{1}{7}, 0\right)$

B) **a.** No horizontal asymptote
b. Not applicable

Solve the problem.

10) The graph of $f(x) = \dfrac{10x^3 + 8}{13x^3}$ will behave like which function for large values of $|x|$? 10) _____

A) $y = \dfrac{10x}{13}$ B) $y = \dfrac{10}{13x}$ C) $y = \dfrac{10}{13}x^3$ D) $y = \dfrac{10}{13}$

Identify the asymptotes.

11) $f(x) = \dfrac{x^3 - 4x^2 - 9x + 8}{x^2 - 6}$ 11) _____

A) Vertical asymptotes: $x = \sqrt{6}$ and $x = -\sqrt{6}$
Horizontal asymptote: $y = 1$

B) Vertical asymptotes: $x = \sqrt{6}$ and $x = -\sqrt{6}$
Slant asymptote: $y = x - 4$

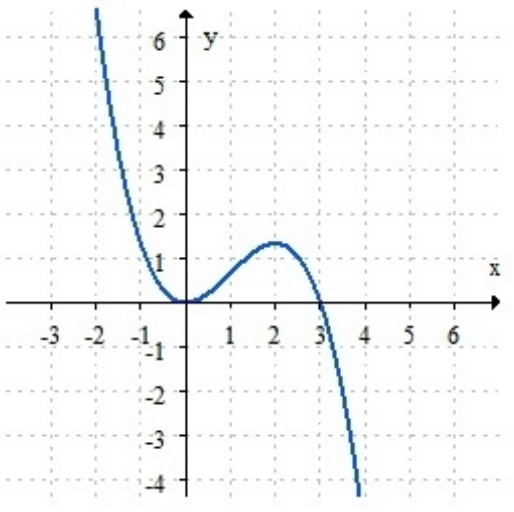
12) $f(x) = \dfrac{4x^3 + 3x + 3}{2x^2 - 4x + 3}$ 12) _____

A) Slant asymptote: $y = 2x + 4$

B) Horizontal asymptote: $y = 2$

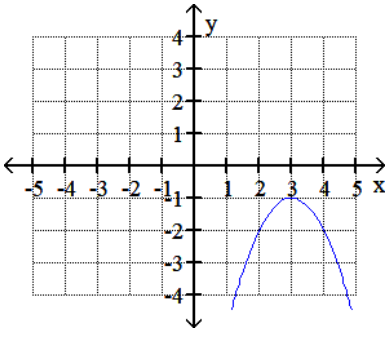
The graph of $y = f(x)$ is given. Solve the inequality.

13) $f(x) < 0$ 13) _____



A) $(3, \infty)$ B) $(-\infty, 0) \cup (0, 3)$

14) $f(x) \geq 0$ 14) _____



A) { } B) $(-\infty, \infty)$

Solve the inequality. Write the solution set in interval notation.

15) $a^2 + 6a + 9 > 0$ 15) _____

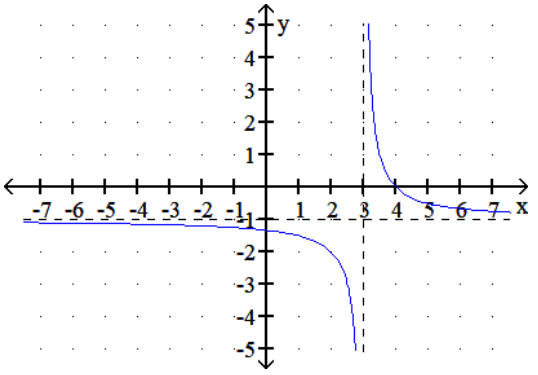
A) $(-\infty, -3) \cup (-3, \infty)$ B) $(-\infty, \infty)$

16) $-16y - 64 \geq y^2$ 16) _____

A) $\{-8\}$ B) $(-\infty, -8) \cup (-8, \infty)$

The graph of $y = f(x)$ is given. Solve the inequality.

17) $f(x) > 0$ 17) _____



A) (3, 4) B) [3, 4]

Solve the inequality. Write the solution set in interval notation.

18) $\frac{x+1}{x-2} \le 0$ 18) _____

A) [-1, 2) B) (-1, 2) C) (-2, 1] D) (-2, 1)

19) $\frac{9-x}{x+11} \ge 0$ 19) _____

A) $(-\infty, -11] \cup [9, \infty)$ B) [-11, 9)
C) $(-\infty, -11) \cup (9, \infty)$ D) (-11, 9]

20) $\frac{7x}{x+2} \ge 7$ 20) _____

A) $(-\infty, -2]$ B) $(-\infty, -2)$ C) $(-\infty, 0]$ D) $(-\infty, 0)$

21) $\frac{6}{2-x} \le \frac{2}{5-x}$ 21) _____

A) (2, 5) B) $(2, 5) \cup \left[\frac{13}{2}, \infty\right)$

1) B
2) B
3) B
4) B
5) B
6) A
7) B
8) A
9) B
10) D
11) B
12) A
13) A
14) A
15) A
16) A
17) A
18) A
19) D
20) B
21) B