Graph the function. Identify the graph's asymptotes and the function's domain and range.

1.) $y = \dfrac{4}{x-3}$
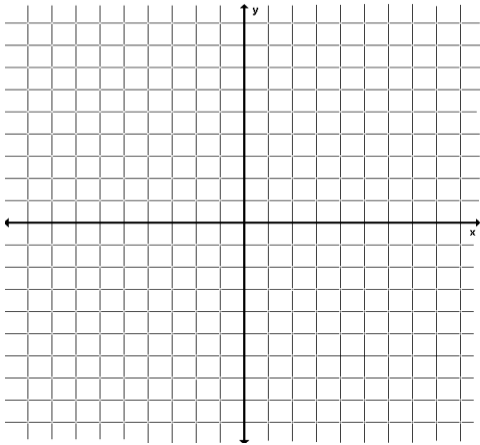
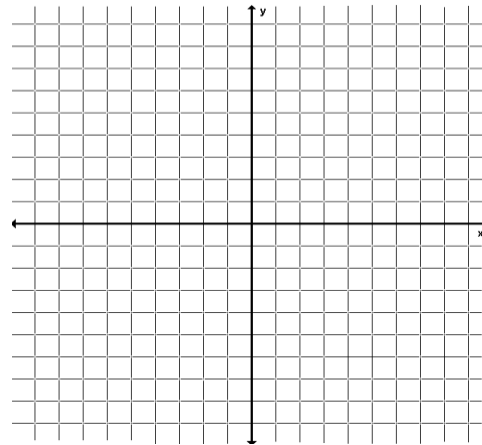

asymptotes: _____

domain: _____

range: _____
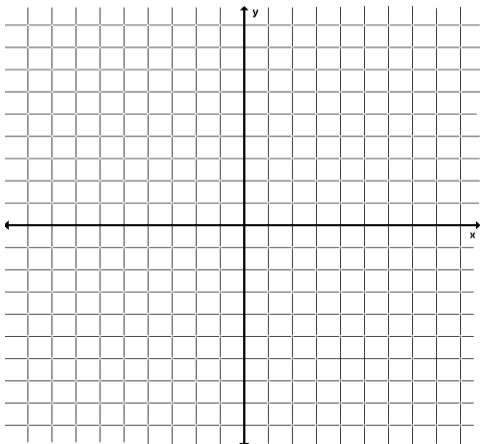
2.) $f(x) = \dfrac{1}{x+5} + 2$

asymptotes: _____

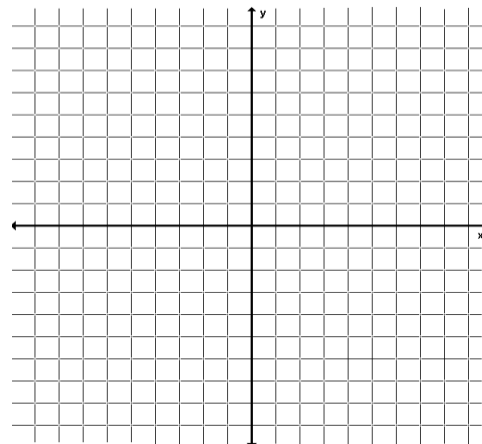domain: _____

range: _____

3.) $y = \dfrac{3x-2}{x-4}$

asymptotes: _____

domain: _____

range: _____

4.) $f(x) = \dfrac{6-x}{2x+1}$

asymptotes: _____

domain: _____

range: _____

Simplify the rational expression, if possible.

5.) $\dfrac{x^2 + 2x - 24}{x^2 + 7x + 6}$

6.) $\dfrac{3x^3 + 6x^2 + 12x}{x^3 - 8}$

7.) $\dfrac{x^2 + 4x - 5}{x^2 - 25}$

Multiply or divide the expressions. Simplify the result.

8.) $\dfrac{80x^4y}{y^3} \cdot \dfrac{xy}{5x^2}$

9.) $\dfrac{x - 3}{2x - 8} \cdot \dfrac{6x^2 - 96}{x^2 - 9}$

10.) $\dfrac{x^2 + 12x + 36}{x^2 - 8x + 12} \cdot (x^2 - 36)$

11.) $\dfrac{3x^2y}{4x^3y^5} \div \dfrac{6y^2}{2xy^3}$

12.) $\dfrac{16x^2 - 8x + 1}{x^3 - 7x^2 + 12x} \div \dfrac{20x^2 - 5x}{15x^3}$

13.) $\dfrac{6x^2 + x - 15}{4x^2} \div (3x^2 + 5x)$

Perform the indicated operation(s) and simplify.

14.) $\dfrac{3x}{x+5} - \dfrac{4x+1}{x+5}$

15.) $\dfrac{8}{3x^2} - \dfrac{5}{4x}$

16.) $\dfrac{4}{x-3} + \dfrac{2}{x+6}$

17.) $\dfrac{3x}{x^2+x-12} - \dfrac{6}{x+4}$

18.) $\dfrac{4}{x+5} + \dfrac{2x}{x^2-25}$

19.) $\dfrac{3}{x} + \dfrac{2}{x-2} - \dfrac{2}{x^2}$

Simplify the complex fraction.

20.) $\dfrac{\dfrac{2}{x} - 4}{\dfrac{2}{x} + 3}$

21.) $\dfrac{\dfrac{3}{x-2} - \dfrac{6}{x^2-4}}{\dfrac{3}{x+2} + \dfrac{1}{x-2}}$

Solve the equation. Check for extraneous solutions.

22.) $\dfrac{2x}{9} = \dfrac{2}{x}$

23.) $\dfrac{6}{x+2} = \dfrac{x-3}{2x+4}$

24.) $\dfrac{x+12}{3} = \dfrac{2x+3}{x+2}$

25.) $\dfrac{x-4}{x-2} - \dfrac{2x-1}{x-2} = 2$

26.) $\dfrac{x-1}{x} + \dfrac{2x-1}{x+3} = \dfrac{x+6}{x+3}$

27.) $\dfrac{5}{x} + \dfrac{x+1}{x+2} = \dfrac{2x+9}{x+2}$

28.) $\dfrac{1}{x+6} + \dfrac{x+1}{x} = \dfrac{13}{x+6}$