1) Graph the function and state the domain and range.
\[ y = \frac{-1}{x + 4} \]

\[ D: \text{______________} \quad R: \text{______________} \]

2) Graph and state the domain and range
\[ g(x) = \frac{4x + 5}{x + 1} \]

\[ D: \text{______________} \quad R: \text{______________} \]

3) Find the quotient:
\[ \frac{4x}{5x - 20} \div \frac{x^2 - 2x}{x^2 - 6x + 8} \]

4) Simplify:
\[ \frac{x^2 - 2x - 3}{x^2 - x - 6} \]

5) Simplify:
\[ \frac{x^4 - 16}{5x^3 - 3x^2 + 20x - 12} \]

6) Find the product:
\[ \frac{x^2 - x - 6}{x^2 + 8x + 16} \cdot \frac{3x^2 + 12x}{x^2 - 2x - 3} \]
7) Find the difference: \[ \frac{x^2 - 3}{x^2 - 6x - 16} - \frac{x + 5}{x + 2} \]

8) Find the sum: \[ \frac{7}{x^2 - 5x - 24} + \frac{3}{x - 8} \]

9) Solve: \[ \frac{2}{x - 4} = \frac{x - 3}{x - 1} \]

10) Solve: \[ \frac{x - 5}{4} = \frac{x^2 - 5}{x + 4} \]

11) Solve: \[ \frac{x - 4}{x - 5} + 5 = \frac{4x}{x} \]

12) Solve: \[ \frac{4}{x - 1} = \frac{4}{x + 2} \]
ANSWERS:

1) Domain: all real numbers except $-4$; Range: all real numbers except $0$

2) D: all reals except $-1$, R: all reals except $4$

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

Translation 1 unit left and 4 units up

3) $\frac{4}{5}, x \neq 0, x \neq 2, x \neq 4$

4) $\frac{x + 1}{x + 2}, x \neq 3$

5) $\frac{x^2 - 4}{5x - 3}$

6) $\frac{3x(x + 2)}{(x + 1)(x + 4)}, x \neq 3$

7) $\frac{3x + 37}{(x + 2)(x - 8)}$
8) \( \frac{3x + 16}{(x - 8)(x + 3)} \)

9) \( x = 2, 7 \)

10) \( x = 0, -\frac{1}{3} \)

11) \( x = \frac{9}{2} \)

12) \( x = 2, -4 \)