

## Worksheet

1. Sketch a graph of each of the following functions. Graph must be approximately to scale, include detailed labels, and indicate open/closed intervals where needed.

(a) 
$$f(x) = \begin{cases} x^2 - 4, & \text{if } x \leq 2 \\ 4 - x, & \text{if } x > 2 \end{cases}$$

- (b) Only differs from (a) in domain boundaries

$$g(x) = \begin{cases} x^2 - 4, & \text{if } x \leq 1 \\ 4 - x, & \text{if } x > 1 \end{cases}$$

(c) 
$$h(x) = \begin{cases} 1 - 2x, & \text{if } x \leq -1 \\ x^2, & \text{if } |x| < 1 \\ \sqrt{x}, & \text{if } x \geq 1 \end{cases}$$

(d) 
$$f(x) = \begin{cases} e^x, & \text{if } x \leq 2 \\ 2, & \text{if } 2 < x \leq 4 \\ (4 - x)/2, & \text{if } x > 4 \end{cases}$$

2. Solve each of the following for  $x$

(a)  $|x - 9| = 7x$

(f)  $x = 5 + \sqrt{3x - 11}$

(b)  $|x| - 9 = 7x$

(g)  $\frac{1}{x^2 - 3x} + \frac{1}{x - 3} = \frac{3}{x^2 - 3x}$

(c)  $|x^2 - 9| = 7$

(d)  $\sqrt{\frac{3 - x}{x + 2}} = 2$

(e)  $\frac{1}{2x^2} + \frac{5}{2x} = \frac{x - 2}{x^2}$

3. Simplify

(a)  $\frac{x^2 - 36}{x^2 + 5x - 6}$

(e)  $\frac{x^3 - x^2 + x - 1}{x^2 - 1}$

(b)  $\frac{4}{y + 7} - \frac{7}{y - 2}$

(f)  $\frac{\frac{1}{x} - \frac{1}{2}}{4 - x^2}$

(c)  $\frac{a - 4}{a^2 - 2a - 8} \div \frac{1}{a - 5}$

(d)  $\frac{5x\sqrt{x} - 3x^{5/2} + \sqrt{x}}{\sqrt{x}}$