

Key Concepts Review Chapter 3

1. Compute $\frac{f(x+h) - f(x)}{h}$ for each of the following functions. Simplify your answers.

a) $f(x) = x^2 - 4x + 5$

d) $f(x) = \frac{1}{x}$

b) $f(x) = -3x^2 - 2x + 1$

e) $f(x) = \sqrt{x}$

c) $f(x) = 4x^2 - 7x$

2. Graph each of the following using basic shapes with transformations.

a) $y = 2 - (x + 3)^2$

d) $y = \frac{1}{10}(x + 5)^3 - 1$

b) $y = 10|x - 2| - 5$

e) $y = -\sqrt{-x} + 3$

c) $y = -\frac{1}{x-2}$

3. Determine the average rate of change of each of the following functions on the indicated interval

a) $f(x) = x^2 - 4x + 5$ on $[0, 5]$

d) $f(x) = \frac{1}{x}$ on $[1, a]$

b) $f(x) = -3x^2 - 2x + 1$ on $[-3, 2]$

e) $f(x) = \sqrt{x}$ on $[1, 9]$

c) $f(x) = 3x^2$; $x = 2$, $x = 2 + h$

4. For each of the following,
- Express the quadratic function in form $f(x) = a(x-h)^2 + k$
 - Sketch its graph.
 - Find its maximum or minimum value

a) $f(x) = x^2 - 4x + 5$

d) $f(x) = 5x^2 - 20x$

b) $f(x) = -3x^2 - 18x + 1$

e) $f(x) = -2x^2 - 4x - 3$

c) $g(x) = 2x^2 - 8x + 13$

5. For each of the following pairs of functions find,

a) $(f \circ g)(x)$

b) domain of $(f \circ g)(x)$

a) $f(x) = \frac{x}{x+1}, g(x) = 2x - 1$

d) $f(x) = \sqrt{x}, g(x) = \sqrt{x+3}$

b) $f(x) = \frac{x}{x-2}, g(x) = \frac{2}{x+5}$

e) $f(x) = \sqrt{3-x}, g(x) = \sqrt{2x+1}$

c) $f(x) = \frac{3}{x+4}, g(x) = \frac{x}{6-5x}$

6. For each of the following functions, find $f^{-1}(x)$,

a) $f(x) = 3x + 5$

d) $f(x) = \sqrt{3-x}$

b) $f(x) = \frac{1}{3x-2}$

e) $f(x) = -x^3 + 2$

c) $f(x) = 2 - 3x^2, x \leq 0$