Review Exercises (Ch. 8)

1) A *function* is a rule that associates a unique output to an allowable input value.

3) This table represents a function because each input has a unique output value associated with it.

a) Domain = $\{\alpha, \beta, \gamma, \varepsilon\}$

b) Range = {1, 2, 3}

5)

a) Domain:  *diameter*

b) $sauce(0) = \frac{1}{16}\pi \quad (0)^2 = 0$

$sauce(35) = \frac{1}{16}\pi \quad (35)^2 \approx 241$

Range:  *sauce*

7)

a) $f(3) = (3) + 1 = 4$

b) $g(2) = (2)^2 - 2(2) = 4 - 4 = 0$

c) $h(-1) = -16(-1)^2 + 25(-1) + 6 = -16(1) - 25 + 6 = -35$

d) $p(4) = \sqrt{(4) + 5} = \sqrt{9} = 3$

e) $q(-2) = 4(-2)^3 - 2(-2) = 4(-8) - (-4) = -32 + 4 = -28$

f) $r(1) = \frac{9}{(1)-4} = \frac{9}{-3} = -3$

9) Not a function

11) Domain = {A, B, C, D}   Range = {4, 6, 8, 10}

13) Domain = $\{x : -\infty < x < \infty\}$  x

Range = $\{y : -1 \le y\}$  y

15)

a)

Basic Function	Quadrant(s) Function Passes Through
Linear	I, III
Quadratic	I, II
Cubic	I, III
Square Root	I
Absolute Value	I, II
Reciprocal	I, III

b)

17) Local minimum at (0,0)   Local maximum at $(2, \frac{4}{3})$

19) $f(x) = x + 2$ $\qquad g(x) = x^2 - 4$

a) $g(2) = (2)^2 - 4 = 4 - 4 = 0$
$f(g(2)) = f(0) = (0) + 2 = 2$

b) $g(3) = (3)^2 - 4 = 9 - 4 = 5$
$f(g(3)) = f(5) = (5) + 2 = 7$

c) $f(g(x))$
$= f(x^2 - 4)$
$= (x^2 - 4) + 2$
$= x^2 - 2$

d) $f(0) = (0) + 2 = 2$
$g(f(0)) = g(2) = (2)^2 - 4 = 4 - 4 = 0$

e) $f(-2) = (-2) + 2 = 0$
$g(f(-2)) = g(0) = (0)^2 - 4 = 0 - 4 = -4$

f) $g(f(x))$
$= g(x + 2)$
$= (x + 2)^2 - 4$
$= (x + 2)(x + 2) - 4$
$= x(x + 2) + 2(x + 2) - 4$
$= x^2 + 2x + 2x + 4 - 4$
$= x^2 + 4x$

21) A ⌠ 4, B ⌠ 2, C ⌠ 1, D ⌠ 5, E ⌠ 3

23) The graph is shifted to the left 4 units and down 2 units. If $f(x) = \sqrt{x}$ and $g(x) = f(x + 4) - 2$, then $g(x) = \sqrt{x + 4} - 2$.

25) The graph of $g(x) = -16(x - 2)^2$ is the same as that of $f(x) = x^2$ shifted to the right 2 units, stretched away from the *x*-axis (by a scale factor of 16), and reflected over the *x*-axis.