3.1.1
a) domain of f = {a, b, c, d, e}

b) target of f = {w, x, y, z}

c) range of f = {w, y, z}

3.1.3
a) Not a function of $\mathbb{R}$ to $\mathbb{R}$

b) Yes, it is a function of $\mathbb{R}$ to $\mathbb{R}$. Range: $[-¼, 2) \cup (2, \infty)$

c) Yes, it is a function of $\mathbb{R}$ to $\mathbb{R}$. Range: $[0, \infty)$

3.1.6 (a, b)
a) The two functions are equal

b) The two functions are not equal. Given x = -3, f(-3) = -27 ≠ g(-3) = 27

3.2.2
a) Boxes needed = $\lceil 24/5 \rceil$ * x (Let x = the number of students)

b) Boxes that can be sold = $\lfloor 8/y \rfloor$ (Let y = the number of cookies)

3.2.3 (d, e)
d) -1

e) 2

3.3.2 (a, b, c)
a) Function *f* is neither one-to-one or onto.
The integers -3 and 3 are in the domain and both map to 9 in the range, making it not one-to-one.
The integer -3 is a member of the target $\mathbb{R}$, which is not a member of the range making it not onto.

b) Function *g* is both one-to-one and onto.

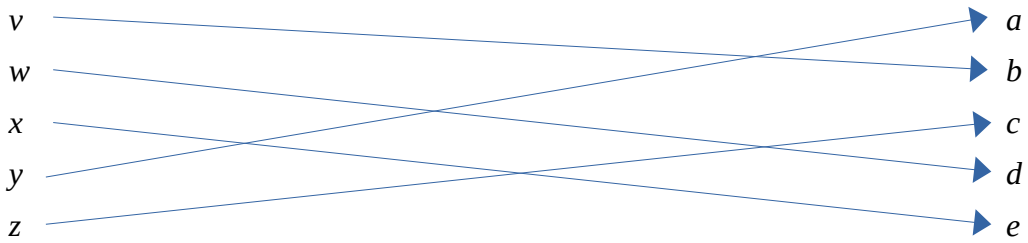
c) Function *h* is both one-to one and onto.

3.3.4 (a, c)
a) Function *f* is onto but not one-to-one.
The strings 1011 and 0011 are in the domain and both map to 011 in the range, making it not one-to-one.

c) Function *f* is both one-to-one and onto.

3.4.1 (a, b)
a) Function f^{-1} is not well defined. *w* which is in the domain of f^{-1} points to both *b* and *d.*

b)



3.4.2 (c, h)

c) The inverse is a well-defined function.

$f(x) = 2x + 3 \quad f^{-1}(y) = \frac{y-3}{2}$ $f^{-1} = \{(y, x) : (x, y) \in f\}$

h) The inverse is a well-defined function.

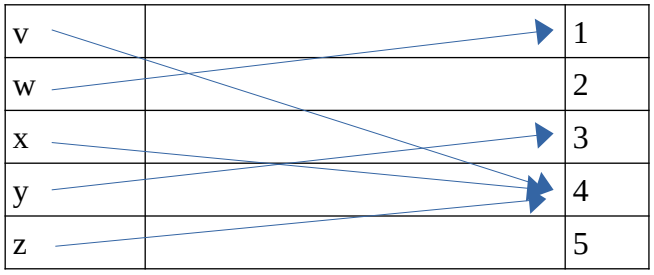
$f\{0, 1\}^3 \rightarrow \{0, 1\}^3 \quad f^{-1}\{0, 1\}^3 \rightarrow \{0, 1\}^3$

3.5.1

a) The domain of g(f(x)) is the set X = {v, w, x, y, z}

b) The target of g(f(x)) is the set S = {1, 2, 3, 4, 5}

c) Arrow diagram of g(f(x)):



d) The range of g(f(x)) is the {1, 3, 4}

3.5.2 (b, e)

b) 121

e) $f(g(x)) = (2^x)^2$

3.5.6 (a)

a) g(f(010)) = g(110) = 011

3.5.8 (b)

b) f(g(x)) = 10x + 17

3.6.1 (b, d)
b) 6^{4k}

d) 6^{3k-1}

3.6.2 (a, e)
a) $\log_5 2k$

e) $log_3 \frac{k^2}{25}$