Exercises 1

(CW, ex2.4, Prob. 1) Given $S_1 = \{3,6,9\}$, $S_2 = \{a,b\}$, and $S_3 = \{m,n\}$, find the Cartesian products:

a) $S_1 \times S_2$ b) $S_2 \times S_3$ c) $S_1 \times S_3$

(CW, ex2.4, Prob. 7) In the theory of the firm, economists consider the total cost C to be a function of the output level Q: $C = f(Q)$

a) According to the definition of a function, should each cost figure be associated with a unique level of output?
b) Should each level of output determine a unique cost figure?

(CW, ex2.4, Prob. 8) If an output level Q_1 can be produced at a cost of C_1, then it must also be possible (by being less efficient) to produce Q_1 at a cost of C_1 + \$1, or C_1 + \$2, and so on. Thus, it would seem that output Q does not uniquely determine total cost C. If so, to write $C = f(Q)$ would violate the definition of a function. How, in spite of this reasoning, would you justify the use of the function $C = f(Q)$?

(SH, Section 4.2, Prob. 9)

a) The cost of removing p% of the impurities in a lake is given by $b(p) = \frac{10p}{105-p}$. Find b(0), b(50), and b(100)
b) What does b(50 + h) – b(50) mean (where $h \geq 0$)?

(SH, Section 5.2, Prob. 3)

If $f(x) = 3x - x^3$ and $g(x) = x^3$ compute:

$(f+g)(x), (f-g)(x), (fg)(x), \left(\frac{f}{g}\right)(x), f\big(g(1)\big)$, and $g\big(f(1)\big)$

(SH, Section 5.2, Prob. 4)

Let $f(x) = 3x + 7$. Compute $f\big(f(x)\big)$. Find the value x^* when $f\big(f(x^*)\big)$.

(SH, Section 5.3, Prob. 1)

Demand D as a function of P is given by

$$D = \frac{32}{5} - \frac{3}{10}P$$

Solve the equation for P and find the inverse function.

(SH, Section 5.3, Prob.7) If f is the function that tells you how many kilograms of carrots you can buy for a specified amount of money, then what does f^{-1} tell you?