04b Sample Examination Problems Chapter 3

1. A company which manufactures drink dispensing machines sets the fill level at 198cc. The standard deviation is 4cc. Assuming that the fill levels have a normal distribution,
   (a) What proportion of drinks will have less than 195cc?
   (b) What is the probability that a random sample of 50 drinks has a mean value greater than 199cc?
   (c) The company claims that an average drink is 200cc. What percentage of the sample means is 200cc or more if samples of size 36 are taken?
   (d) Explain briefly why you would or would not buy this dispensing machine.

2. Suppose that X has a Poisson distribution with mean λ.
   (a) Find by summation the mean of X.
   (b) Find also the variance of X.

3. The distribution of random variable X has density function

$$f_X(x) = 1/3$$

   where $-1 < x < 2$.
   (a) Find by integration the mean of X.
   (b) Find also the variance of X.
   (c) What is the $P[X > 1|X > 0]$?

4. If W is a Poisson random variable with mean 2, what is $P(W > 3|W > 1)$?

5. X is a random variable with $P(X = 0) = 0.1$, $P(X = 1) = 0.3$, $P(X = 2) = 0.4$. X can also take the value of 3, but no other values. What is $E[X^2]$?

6. If $x_1 = 3, x_2 = 2, x_3 = 4, x_4 = 2, x_5 = 5$, and all are equally likely values for X, what is $E[X(X-1)]$?