INTRODUCTORY MATHEMATICAL STATISTICS (STAT2001/6039)

Tutorial 7

Problem 1

A continuous random variable Y has pdf (probability density function)

$$f(y) = c(2-y), \quad 0 < y < 2.$$

(a) Find Y's mean, variance and standard deviation.

(b) Find $E(7Y^2 - 2Y + 6)$.

Problem 2

Suppose that $Z \sim N(0,1)$.

(a) Find Z's moment generating function.

(b) Use this function to find Z's mean, variance and third central moment.

(c) Hence find the mean, variance and third central moment of $Y = a + bZ$.

Problem 3

The times to failure of a certain brand of ink jet printer are approximately normally distributed with a mean of 1500 hours and a standard deviation of 200 hours.

(a) What percentage of such printers will fail before 1000 hours?

(b) What should the guarantee time for these printers be if the manufacturer wants only 5% to fail within the guarantee period?

(c) Without using tables, find an upper bound for the proportion of printers that will fail before 500 hours.

Problem 4

Explosive devices used in a certain type of mining operation cause nearly circular craters to form in a rocky surface. The radii of these craters are exponentially distributed with a mean of 3 metres.

(a) Find the mean and variance of the area covered by such a crater.

(b) Find the probability that the next crater formed will have an area greater than 12 square metres.