Tutorial Sheet 28
(Normal Distribution II)

1.   A software house found that the project value received over the past year were approximately normally distributed, with a mean of $43,000 and a standard deviation of $8,500. Suppose the project value remains the same next year,
   a)   what proportion of new projects would you expect to be $35,000 or less?
   b)   what proportion of new projects would you expect to be greater than $50,000?
   c)   what proportion of new projects would you expect to be between $30,000 and $45,000?
   d)   what proportion of new projects would you expect to be between $35,000 and $40,000?
   e)   what proportion of new projects would you expect to be between $41,000 and $45,000?
   f)   what proportion of new projects would you expect to be less than $30,000?

2.   The mean time required to change a tyre of a racing car is 45 seconds, with a standard deviation of 8 seconds. What is the probability that changing a tyre is completed within 50 seconds?

3.   In an examination, the scores are normally distributed with mean 58.3 and standard deviation 10.7. If a score of 50 is required to pass the examination, what is the probability that a candidate chosen at random has passed the examination?

4.   An electricity company installed 2000 electric lamps in a new town. The lamps have an average life of 1000 burning hours with a standard deviation of 200 hours. Assume a normal distribution for the life of a lamp.
   a)   What is the probability that a lamp will fail in the first 700 burning hours?
   b)   How many lamps might be expected to fail in the first 700 burning hours?

5.   In a certain network, the binary digit 0 is sent as a voltage signal of zero volt and the received signal has a level represented by the random variable X, being normally distributed with a mean of 0 and a standard deviation of 0.4; the binary digit 1 is sent as a voltage signal of 1 volt and the received signal has a level represented by the random variable Y, being normally distributed with a mean of 1 and a standard deviation of 0.3. The receiver interprets a level of 0.8 volt or higher as a binary digit 1. Otherwise the received signal is interpreted as the binary digit 0.
   a)   Find the probability that a zero is received correctly.
   b)   Find the probability that a one is received correctly.
   c)   Find the probability that a digit is received correctly assuming that 0 and 1 are equally likely to be transmitted.