BASIC NORMAL DISTRIBUTION

1) If $Z \sim N(0, 1)$, then use statistical tables to find:

a) $P(Z < -0.158)$, b) $P(-1.4 < Z < 1.018)$.

2) If $Z \sim N(0, 1)$, then find a if $P(Z < a) = 0.1329$.

3) If $X \sim N(12, 6)$, then find $P(X > 8)$.

4) A certain kind of shrub have heights which are normally distributed with mean 45 cm and standard deviation 12 cm.. Find,

a) the probability that a randomly chosen shrub has a height in excess of 50 cm,

b) the probability that a randomly chosen shrub has a height between 42 cm and 50 cm.

5) A certain intelligence test produces scores which are normally distributed with mean 100 and variance 220.

a) Find the probability that a randomly chosen student scores more than 130 in the intelligence test.

b) Find the score exceeded by the top 1% of students in the intelligence test.

c) Find the highest score obtained by the bottom 25% of students in the intelligence test.

{Draw a diagram!}

6) The time taken to complete an application form is normally distributed with mean 14·1 minutes and standard deviation 2·5 minutes. Find

a) the probability that a randomly chosen applicant takes less than 10 minutes to complete the form,

b) the probability that out of five randomly chosen applicants, exactly three of them take less than 10 minutes to complete the form.

7) The time required to complete a certain car journey has been found from experience to have mean 2 hours 20 minutes and standard deviation 15 minutes.

a) Use a normal model to calculate the probability that, on one day chosen at random, the journey requires between 1 hour 50 minutes and 2 hours 40 minutes.

b) It is known that delays occur rarely on this journey, but that when they do occur they are lengthy. Give a reason why this information suggests that a normal distribution might not be a good model.

ANSWERS.

1) a) 0.4372, d) 0.7649.
2) $a = -1.113$.
3) 0.9487.
4) a) 0.3384, b) 0.2603.
5) a) 0.0216, b) 134.50 (2 decimal places), c) 90.00 (2 decimal places).
6) a) 0.0505, b) 0.001161085.
7) a) 0.8859, b) A normal distribution would mean that the longer the delay, the less chance there would be of it occurring. Thus the normal distribution might not be a good model.