**Crown Institute of Higher Education**

BUS104

Week 5 - workshop discussion/practice questions

**Probability Distributions – The Normal Distribution**

Response times for priority one (000) emergency calls for a metropolitan ambulance service are approximately normally distributed with mean 15.4 minutes and standard deviation 3.1 minutes.

(1) Construct a neat sketch graph of the response times probability distribution making sure you provide a suitably scaled, graduated and labelled horizontal (X) axis (with units).

(2) Express the provided mean and standard deviation response time information symbolically using appropriate statistical notation. **Hint: Take care with the notation – are we dealing with a sample or a population?**

(3) Under the horizontal (X) axis in (a), draw a Z axis providing a suitable scale with appropriate graduations and labels corresponding with those provided on the X axis.

(4) Before you proceed any further take a minute or two to reflect on what your knowledge of the normal distribution enables to say about ambulance response times assuming this model. **Hint: What ambulance time would you typically “expect” to observe? Recall the Empirical Rule – approximately what percentage of ambulance response times would you expect to observe between 12.3 and 18.5 minutes, between 9.2 and 21.6 minutes, between 15.4 and 24.7 minutes? What would you expect to be the maximum response time? What would you expect to be the minimum response time?**

(5) Determine the probability of observing an ambulance response time that is;

(i) less than 10 minutes.

(ii) less than 20 minutes.

(iii) between 10 and 20 minutes.

(iv) greater than 10 minutes.

(6) In the work you have done with the binomial probability distribution you will have realised that P(x < 10), for example, is often going to return a different value to P(x ≤ 10). Is this the case for the normal distribution? Briefly explain the reasoning behind your answer.

(7) Common key performance indicators of many ambulance services make reference to the median and/or the 90’th percentile response time. State/determine these two values for the ambulance service referred to above. Briefly explain what specific information these two values provide about ambulance response times in this particular ambulance service. **Hint:**

**You should be able to “state” the median response time (without the need for any working) but you will need to calculate the 90’th percentile**