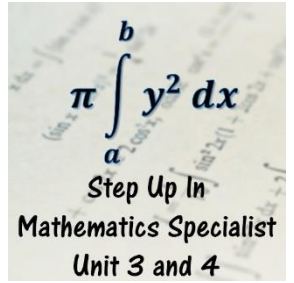# 6.2 Sample Means

Problems Worksheet

1. State the Central Limit Theorem.

2. Describe, in your own words, why the means of samples taken from a uniformly distributed population are normally distributed. Include a diagram in your description.

3. A population of emperor penguins is known to be normally distributed with a mean height of 120 cm and a standard deviation of 4 cm.

   a. 100 samples each of size 36 is taken from the population and the height measured. How would you expect the means of these 100 samples to be distributed?

   b. Find the probability that a randomly selected emperor penguin will have a height exceeding 121 cm.

   c. Find the probability that a randomly selected sample of size 36 will have a mean height exceeding 121 cm.

4. A machine fills packets of nuts with according to a normal distribution with a mean of 155 g and standard deviation of 3 g. The packets are labelled as being 150 g.

   a. Determine the probability that a packet is underweight.

   b. Samples of size 25 are taken from the production line each day for a year. How will the means of these samples be distributed?

   c. Calculate the probability that such a sample will have a mean weight less than 154 g.

   d. A sample of size 25 has been taken from a packing machine at the factory, however it is not known which machine it has been taken from. This sample is known to have a mean mass of 151 g. Comment on the likelihood that this sample was taken from the machine described in this question. Use a calculation to support your conclusion.