1. Weekly sales for a grocery store follow a normal distribution with mean 300,000 and standard deviation 25,000. Use the Empirical Rule to approximate the following probabilities.

   (a) What is the probability the store will have between 250,000 and 350,000 in sales next week?

   Answer:

   This is the area within 2 standard deviations of the mean and thus the probability is 95% by the Empirical Rule.

   (b) What is the probability the grocery store will have less than 275,000 in sales next week?

   Answer:

   This is the area below 1 standard deviation less than the mean. We know that 1-0.68 = 0.32 area is outside of 1 standard deviation and the area below 1 standard deviation is 0.32/2=0.16.

   (c) What is the probability the grocery store will have greater than 375,000 in sales next week?

   Answer:

   This is the area above 3 standard deviations greater than the mean. We know that 1-0.997=0.003 area is outside of 3 standard deviations and the area above 3 standard deviations is 0.003/2=0.0015.

2. The end-of-day inventory at a semiconductor chip storage facility follows a normal distribution with mean 1,500 with a standard deviation of 500. Use the Empirical Rule to approximate the following probabilities.

   (a) What proportion of days have an inventory between 1,000 and 2,000 chips?

   Answer:

   This is within 1 standard deviation of the mean and thus the probability is 0.68.

   (b) What proportion of days have an inventory above the facilities storage limit of 3,000 chips?

   Answer:

   This is the area above 3 standard deviations of the mean. We calculated this in 1c) as 0.0015.

   (c) Why might the normal distribution not be a reasonable modelf or these data?

   Answer:

   The normal distribution may not be a reasonable model because the number of chips must be positive, but the normal distribution allows negative numbers. In this case, there is only 0.0015 area below 0 and thus this discrepancy will likely not matter too much.