1. Assume the runners in a race have run times which follow a normal distribution with a mean of 122 seconds and a sd of 6 seconds. Answer the following.

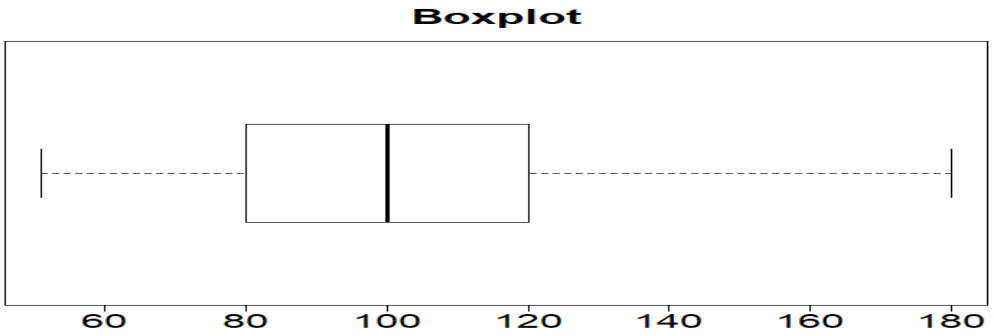
   (a) What are the subject, variable and variable type?
   The subject is a runner, the run time is the variable, and it is a quantitative / numeric variable.

   (b) What is the chance of three randomly selected runners all having a time of less than 122 seconds?
   Since it's normal, we have a 50% chance of being below 122. Consider that this happens independently and we need this to happen three times, so $\frac{1}{2}^3 = \frac{1}{8}$
   Independence guarantees that the probability can be calculated by multiplication.

   (c) What is the chance of a randomly selected runner having a time of greater than 128 seconds?
   z-score = 1, $P(Z > 1) = 0.16$
   Use the formula $z - score = \frac{Observation - Average}{SD}$*. And then use z-table to check the quantile.*

   (d) What is the chance that, if we randomly selected two runners, exactly one will have a run time greater than 128 seconds?
   *2*0.16*(1-0.16) = 0.27*
   We could interpret this as follows: the first one has a run time greater than 128 seconds and the second one has a run time smaller than 128 seconds or the second one has a run time greater than 128 seconds and the first one has a run time smaller than 128 seconds. Then, we can calculate the chance for this two possible situations.

2. Examine the following boxplot. The underlying data set has a sd of 40.



   (a) Can we conclude that 68% of the data is in the interval [60, 140]? Why or why not?
   No, we can't assume it's normal. It specifically looks not normal, because it seems to be right skewed.
   Note: if some data is normally distributed, then we could use z-score to calculate its distribution.

   (b) What is the probability that a randomly chosen value is in the interval 120 to 180?
   This is between the third quartile and the maxium, so it contains 25% of the data and we have a 25% chance of finding a value there.

If without the boxplot and assuming the distribution to be normal, then we could use z-score to compute it.

(c) Will the mean be less than, greater than, or about equal to the median?
Likely greater than, as the data appears to be skewed right.