Chapter6: Sampling Distributions

Q1.

The average active-ingredient yield per liter of raw material for samples of vials may be approximated by a normal distribution with mean $\mu = 30$ grams and standards deviation $\sigma = .2$ gram.

   i) Find the probability that the average yield of a sample of size 9 is (1) less than 29.55 grams, (2) between 29.5 and 30.25 grams, (3) greater than 30.45 grams, and (4) between 30.15 and 30.35 grams.
   ii) Find the 20th and the 90th percentiles. Interpret them.

Q2.
The life in years of a certain type of electrical switches has an exponential distribution with an average life of 2. A sample of size 36 is selected by random, what is the probability that the sample mean will be more than 3?

Q3.

A certain machine makes electrical resistors is normally distributed with a mean of 40 ohms. A random sample of 18 of these resistors indicates a standard deviation of 1.56 ohms. Find the interval of sample mean resistance that will contain 95% of all sample means.

Q4.

Adding graphite spheres to iron can improve its ductile qualities. Diameters of these graphite spheres are measured. With 95% confidence and a standard deviation is 0.16, find the optimum sample size so that true mean diameter can be estimated within an error of 0.02 units?

Q5:

2) A quality-control inspector accepts shipments of 500 precision steel rods if the mean diameter of a sample of $n = 100$ falls between .4995" and .5005". Previous evaluations have established that the standard deviation for individual rod diameters is .003".
   i) What is the probability that the inspector will accept an out-of-tolerance shipment having $\mu = .5003$"?
   ii) What is the probability that the inspector will reject a near-perfect shipment having $\mu = .499$"?