EE381 Homework #10

1) A population consists of the four numbers 3, 7, 11, 15. Consider all possible samples of size two that can be drawn with replacement from this population. Find
   a) The population mean and standard deviation.
   b) The mean and standard deviation of the sampling distribution of means
   c) Repeat question (a) and (b) if sampling is without replacement.
2) The weights of 1500 ball bearings are normally distributed with a mean of 22.40 oz and a standard deviation of 0.048 oz. If 300 random samples of size 36 are drawn from this population, determine the expected mean and standard deviation of the sampling distribution of means if sampling is done
   a) With replacement
   b) Without replacement
3) In question (2), how many of the random samples would have their means:
   a) Between 22.39 and 22.41 oz
   b) Greater than 22.42 oz
   c) Less than 22.37 oz
   d) Less than 22.38 or more than 22.41 oz
4) A manufacturer sends out 1000 lots, each consisting of 100 electric bulbs. If 5% of the bulbs are normally defective, in how many of the lots should we expect
   a) Fewer than 90 good bulbs
   b) 98 or more good bulbs
5) A and B manufacture two types of cables, having mean breaking strengths of 4000 and 4500 lb and standard deviation of 300 and 200 lb, respectively. If 100 cables of brand A and 50 cables of brand B are tested, what is the probability that the mean breaking strength of B will be
   a) At least 600 lb more than A
   b) At least 450 lb more than A
6) The table below shows a frequency distribution of the lifetimes of 400 radio tubes tested at the L&M Tube Company. With reference to this table, determine the
   a) Upper limit of the fifth class
   b) Lower limit of the eight class
   c) Class mark of the seventh class
   d) Class boundaries of the last class
   e) Class interval size
   f) Frequency of the fourth class
   g) Relative frequency of the sixth class
   h) Percentage of tubes whose lifetimes do not exceed 600 hours
   i) Percentage of tubes with lifetimes greater than or equal to 900 hours

Lifetime (hours)	Number of Tubes
300–399	14
400–499	46
500–599	58
600–699	76
700–799	68
800–899	62
900–999	48
1000–1099	22
1100–1199	6
TOTAL	400

7) The table below shows the distribution of the maximum loads in short tons (1 short tons = 2000 lbs) supported by certain cables produced by a company. Determine the mean maximum loading using
   a) The "long method"
   b) The coding method

Maximum Load (short tons)	Number of Cables
9–9.7	2
9.8–10.2	5
10.3–10.7	12
10.8–11.2	17
11.3–11.7	14
11.8–12.2	6
12.3–12.7	3
12.8–13.2	1
TOTAL	60

8) Find the standard deviations for the distributions of question (7).

Note: Your answers should show your step-by-step work. Answers which have only final results are not accepted.