Stat 113 (Introduction to Mathematical Statistics)

Problem Set No. 3

INSTRUCTION: Answer the following as indicated. Show detailed solutions. If you express your answer in decimal form, retain at most 3 decimal places in your final answer.

1. The maximum patent life for a new drug is 17 years. Subtracting the length of time required by the FDA for testing and approval of the drug provides the actual patent life for the drug—that is, the length of time that the company has to recover research and development costs and to make a profit. The distribution of the lengths of actual patent lives for new drugs is given below:

Y	3	4	5	6	7	8	9	10	11	12	13
P(Y=y)	0.03	0.05	0.07	0.10	0.14	0.20	0.18	0.12	0.07	0.03	0.01

   a. Compute and interpret the mean patent life for a new drug.

   b. Compute and interpret the standard deviation of Y = the length of life of a randomly selected new drug.

   c. What is the probability that the value of Y falls in the interval $(\mu - 2\sigma,\ \mu + 2\sigma)$?

2. The probability distribution of the grades from a statistics class for the first exam is given by

Y	96	87	65	49	77	74	99	68	56	84
P(Y=y)	3/15	2/15	1/15	1/15	2/15	1/15	1/15	1/15	1/15	2/15

   a. Find the mgf of Y.

   b. Using the mgf, find the mean and standard deviation of Y.

3. The probability that a student entering a university will graduate on time is 0.4. Find the probability that out of 5 students at the university

   a. none will graduate on time.

   b. at least 3 will graduate on time.

   c. at most 2 will graduate on time.