Practice Sheet

QUESTION 1:

In a study conducted by the Department of Mechanical Engineering at Virginia Tech, the steel rods supplied by two different companies were compared. Ten sample springs were made out of the steel rods supplied by each company, and a measure of flexibility was recorded for each. The data are as follows:

Company A	9.3	8.8	6.8	8.7	8.5	6.7	8.0	6.5	9.2	7.0
Company B	11.0	9.8	9.9	10.2	10.1	9.7	11.0	11.1	10.2	9.6

a) Calculate the suitable average for the data set of two companies.
b) Plot the data for the two companies on the same line and give your impression regarding any apparent differences between the two companies.

QUESTION 2:

The lengths of power failures, in minutes, are recorded in the following table.

Lengths of Power Failure (in minutes)							
22	69	121	70	21	132	50	83
18	98	120	66	112	115	96	93
135	102	13	74	21	21	118	95
15	83	22	89	40	28	158	
90	55	124	103	98	43	74	
78	28	112	24	87	37	78	

a) Construct frequency distribution and histogram. Also comment on the shape of distribution of length of power failure.
b) What variation would you observe in the given data?

QUESTION 3:

Below are the lifetimes, in hours, of fifty 40-watt,110-volt internally frosted incandescent lamps, taken from forced life tests:

919	1196	785	1067	972	1122
1156	920	948	905	1340	1157
1170	929	950	1195	1102	1009
1045	855	1195	956	1151	811
938	970	1237	1157	1333	1037
978	832	1009	1022	1311	
765	958	902	958	918	
1217	1085	896	936	1162	
702	923	1126	1092	1035	

a) Compute the five number summary and determine the distribution of data by constructing a box and Whisker plot.
b) Detect outliers if any

QUESTION 4:

a) A witness to a hit-and-run accident told the police that the license number contained the letters RLH followed by 3 digits, the first of which was a 5. If the witness cannot recall the last 2 digits, but is certain that all 3 digits are different, find the maximum number of automobile registrations that the police may have to check.

b) Students at a private liberal arts college are classified as being freshmen, sophomores, juniors, or seniors, and also according to whether they are male or female. Find the total number of possible classifications for the students of that college.

c) A California study concluded that following 7 simple health rules can extend a man's life by 11 years on the average and a woman's life by 7 years. These 7 rules are as follows: no smoking, get regular exercise, use alcohol only in moderation, get 7 to 8 hours of sleep, maintain proper weight, eat breakfast, and do not eat between meals. In how many ways can a person adopt 5 of these rules to follow

   (i) if the person presently violates all 7 rules?
   (ii) if the person never drinks and always eats breakfast?

d) How many three-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, and 6 if
   (i) Each digit can be used only once?
   (ii) How many of these are odd numbers?
   (iii) How many are greater than 330?

e) A drug for the relief of asthma can be purchased from 5 different manufacturers in liquid, tablet, or capsule form, all of which come in regular and extra strength. How many different ways can a doctor prescribe the drug for a patient suffering from asthma?

QUESTION 5:

A survey of magazine subscribers showed that 45.8% rented a car during the past 12 months for business reasons, 54% rented a car during the past 12 months for personal reasons, and 30% rented a car during the past 12 months for both business and personal reasons.

a) What is the probability that a subscriber rented a car during the past 12 months for business or personal reasons?
b) What is the probability that a subscriber did not rent a car during the past 12 months for either business or personal reasons?

QUESTION 6:

An automobile manufacturer is concerned about a possible recall of its best-selling four-door sedan. If there were a recall, there is a probability of 0.25 of a defect in the brake system, 0.18 of a defect in the transmission, 0.17 of a defect in the fuel system, and 0.40 of a defect in some other area.

a) What is the probability that the defect is the brakes or the fueling system if the probability of defects in both systems simultaneously is 0.15?
b) What is the probability that there are no defects in either the brakes or the fueling system?

QUESTION 7:

Suppose that 25% of the population of a city reads newspaper 'A', 20% reads newspaper 'B' , 35% reads newspaper 'C', and 30% read newspaper 'A' and 'B' both. 8% of the population reads newspaper 'B' and 'C', and 5% reads newspaper 'A' and 'C'. Furthermore 4% of the population reads all the three newspapers. What is the probability that a person selected at random from the population reads

a) At least one of these newspapers?
b) Reads none of these newspapers?

QUESTION 8:

A patient is thought to have one of three diseases A_1, A_2 and A_3 whose probabilities under the given conditions are $\frac{1}{2}$, $\frac{1}{6}$ and $\frac{1}{3}$ respectively. A test is carried out to help the diagnosis and it yields a positive result with a probability of 0.1 for disease A_1, a probability of 0.2 for disease A_2 and a probability of 0.9 for disease A_3. What is the probability of A_1disease after testing?

QUESTION 9:

It is observed that 52% of the workers in a company are full-time and of those who are full-time, 80% have health insurance through the company. Of the part-time workers, 15% have health insurance through the company. What is the probability of selecting a full-time worker given that he is insured?

QUESTION 10:

In an experiment to study the relationship of hypertension and smoking habits, the following data are Collected for 180 individuals:

	Nonsmokers	Moderate Smokers	Heavy Smokers
H	21	36	30
NH	48	26	19

where H and NH in the table stand for Hypertension and Non hypertension, respectively. If one of these Individuals is selected at random, find the probability that the person is

a) Experiencing hypertension given that the person is a heavy smoker.
b) A nonsmoker given that the person is experiencing no hypertension.

QUESTION 11:

In a survey of MBA students, the following data were obtained on "students' first reason for application to the school in which they matriculated."

		Reasons for Application		
		School Quality	School Cost or Convenience	Other
Enrollment Status	Full Time	421	393	76
	Part Time	400	593	46

a) Develop a joint probability table for these data.
b) Use the marginal probabilities of school quality, school cost or convenience, and other to comment on the most important reason for choosing a school.
c) If a student goes full time, what is the probability that school quality is the first reason for choosing a school?
d) If a student goes part time, what is the probability that school quality is the first reason for choosing a school?
e) Let A denote the event that a student is full time and let B denote the event that the student lists school quality as the first reason for applying. Are events A and B independent? Justify your answer