

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Do your own work. Show all relevant steps which lead to your solutions. Attach this question sheet to the front of your answer sheets.

1. (22 pts) The following are 18 measurements on the strength (pounds) of paper to be used in cardboard tubes:

43	78	37	40	68	72	55	62	22	82
59	48	76	74	70	51	40	75		

Find the following (if they exist) for the above measurements:

- |    |                     |    |        |    |       |
|----|---------------------|----|--------|----|-------|
| a. | mean                | b. | median | c. | mode  |
| d. | standard deviation  | e. | $Q_1$  | f. | $Q_3$ |
| g. | interquartile range | h. | max    | i. | min   |
| j. | range               |    |        |    |       |

Construct the following for the above measurements:

- |    |           |    |                  |
|----|-----------|----|------------------|
| h. | leaf-stem | j. | box-whisker plot |
|----|-----------|----|------------------|

2. (30 pts) In a 2-week study of productivity of workers, the following data were obtained on the total number of acceptable pieces which 50 workers produced:

55	46	39	74	69	65	38	33	57	46
53	68	47	30	58	82	65	52	26	72
78	60	50	66	47	56	29	67	83	55
49	58	66	84	60	61	50	65	66	35
45	52	62	53	42	70	74	43	84	24

- Construct a frequency distribution (conforming to the guidelines in the text) for the data. Clearly identify the following: class limits, class marks, class frequencies, class intervals.
  - Construct a cumulative frequency distribution for the data.
  - Construct a histogram to graphically represent the data in the frequency distribution.
  - Construct an ogive to graphically represent the data in the cumulative frequency distribution.
  - Construct the mean of grouped data in the frequency distribution.
  - Construct the standard deviation of the grouped data in the frequency distribution.
3. (8 pts) Suppose a sample of 7 balls is to be selected from my bucket of billiard balls (recall it contains: solids 1 through 8; stripes 9 through 15).
- How many different ways can a sample of 7 balls be selected so that it contains 3 solids and 4 stripes?
  - What is the probability that a randomly selected sample of 7 balls will contain 3 solids and 4 stripes?
4. (6 pts) Box A holds three 60-watt bulbs, five 75-watt bulbs and two 100-watt bulbs; box B holds five 60-watt bulbs, four 75-watt bulb and three 100-watt bulbs. One bulb is selected at random out of one of the two boxes. Given the selection procedure, the probability that the bulb is selected from box A is  $1/3$  and the probability that the bulb is selected from box B is  $2/3$ . What is the probability that a 75-watt bulb is selected?

5. (8 pts) The probability that a new airport will get an award for its design is 0.42, the probability that it will get an award for customer service is 0.34 and the probability that it will get both awards is 0.20.
- What is the probability that it will get at least one of the two awards?
  - What is the probability that it will get none of the two awards?

6. (18 pts) The performance of certain machines is predicted by the results of a maintenance program. The predicted performance is labeled PA, PB, PC, PD, where PA is the best and PD is the worst. The prediction is not perfect. The actual performance of the machines is denoted by AA, AB, AC, AD, where AA is best and AD is worst. The following table shows the probabilities of the predictions and performances

<i>Actual Performance</i>	<i>Prediction</i>			
	PA	PB	PC	PD
AA	0.10	0.10	0.00	0.00
AB	0.05	0.20	0.04	0.01
AC	0.00	0.08	0.20	0.01
AD	0.00	0.02	0.04	0.15

Determine the following probabilities:

- $P(PD)$
  - $P(AC)$
  - $P(AC | PD)$
  - $P(AC \cap PD)$
  - $P(PA \cup PC)$
  - $P(AB \cup PC)$
  - $P(AC | AA)$
  - $P(PB | AD)$
  - $P((AC \cup AD) | PC)$
7. (8 pts) The following table is a cross-classification of 10,000 stockholders by the value of their portfolio and the number of securities in their portfolios.
- | <i>Value of Stock</i>   | <i>Number of securities in portfolio</i> |      |       |     |
|-------------------------|--|------|-------|-----|
|                         | 1-5                                      | 6-10 | 11-15 | 16+ |
| Up to \$1999.99         | 200                                      | 100  | 50    | 25  |
| \$2000.00 - \$5999.99   | 100                                      | 400  | 200   | 35  |
| \$6000.00 - \$10999.99  | 50                                       | 1000 | 200   | 70  |
| \$11000.00 - \$20999.99 | 40                                       | 1500 | 1100  | 100 |
| \$21000.00 or more      | 30                                       | 3500 | 1000  | 300 |
- If one of the stockholders is selected at random, what is the probability that he owns 11-15 stocks with a total value between \$6000.00 and \$20999.99?
  - What is the probability that the selected stockholder owns 6-10 stocks?
  - If the stockholder selected is known to own stock at a total value of \$11000.00 - 20999.99, what is the probability that he owns 1-5 stocks?
  - If the stockholder selected is known to own 6-10 stocks, what is the probability that the total value of holdings is less than \$11000.00?