

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 14 measurements on the strength (pounds) of paper to be used in cardboard tubes:

21, 28, 29, 32, 35, 33, 27, 25, 31, 25, 18, 14, 20, 28

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. | range | | | | |

Construct the following for the above measurements:

- | | | | |
|----|-------------|----|------------------|
| h. | dot diagram | 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:

65	36	49	84	79	56	28	43	67	36
43	78	37	40	68	72	55	62	22	82
88	50	60	56	57	46	39	57	73	65
59	48	76	74	70	51	40	75	56	45
35	62	52	63	32	80	64	53	74	34

- 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 5 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 5 balls be selected so that it contains 3 solids and 2 stripes?
 - What is the probability that a randomly selected sample of 5 balls will contain 3 solids and 2 stripes?
4. (6 pts) Box A holds two 60-watt bulbs, three 75-watt bulbs and two 100-watt bulbs; box B holds five 60-watt bulbs, one 75-watt bulb and three 120-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 $\frac{2}{3}$. What is the probability that a 60-watt bulb is selected?

5. (8 pts) The probability that a new airport will get an award for its design is 0.16, the probability that it will get an award for customer service is 0.24 and the probability that it will get both awards is 0.11.

- a. What is the probability that it will get at least one of the two awards?
- b. What is the probability that it will get only one 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:

- a. $P(PC)$
- b. $P(AD)$
- c. $P(AB \mid PC)$
- d. $P(AB \cap PD)$
- e. $P(PB \cup PC)$
- f. $P(AC \cup PB)$
- g. $P(AC \mid AA)$
- h. $P(PC \mid AD)$
- i. $P(AC \cup AD \mid PB)$

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

- a. If one of the stockholders is selected at random, what is the probability that he owns 6-10 stocks with a total value between \$6000.00 and \$20999.99?
- b. What is the probability that the selected stockholder owns 11-15 stocks?
- c. 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 16 or more stocks?

- d. If the stockholder selected is known to own 1-5 stocks, what is the probability that the total value of holdings is less than \$11000.00?