Answer the problems on **separate** paper. You do <u>not</u> 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.   (24 pts) The following are 20 measurements on the strength (pounds) of paper to be used in cardboard tubes:

65	36	49	84	79	56	28	43	67	36
49	58	66	84	60	61	50	65	66	35

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

a.	mean	b.	median	c.	mode
d.	variance	e.	Q_1	f.	Q_3
g.	interquartile range	h.	max	i.	min
j.	range				

Construct the following for the above measurements:

k.	dot diagram	l.	modified box-whisker plot

2.   In a 2-week study of productivity of workers, the following data were obtained on the total number of acceptable pieces which 40 workers produced:

55	46	39	74	69	65	38	33	57	46
53	68	47	30	58	82	65	52	26	72
43	78	37	40	68	72	55	62	22	82
78	60	50	66	47	56	29	67	83	55

a.   (12 pts) Construct a frequency distribution (conforming to the guidelines in the text) for the data. Clearly identify the following: classes, class marks and class frequencies.

b.   (4 pts) Construct a histogram to graphically represent the data in the frequency distribution.

c.   (3 pts) Construct the mean of grouped data in the frequency distribution.

d.   (5 pts) Construct the variance of the grouped data in the frequency distribution.

3.   (8 pts) A carton of 21 rechargeable batteries contains 8 batteries which are defective.

a.   In how many ways can an inspector select a sample of six batteries and get (exactly) two of the defective batteries?

b.   What is the probability that an inspector who selects a sample of seven batteries will get (exactly) three of the defective batteries?

4.   (4 pts) The probability that the statistics group (in the math department) will be recognized on campus for research contributions to the Tech is 0.32 and the probability that they will be recognized by the American Statistical Association (ASA) for professional contributions is 0.20. The probability that they will receive both awards is 0.12. What is the probability that they will receive (exactly) one of the two awards?

5.   (12 pts) To provide prizes for the conclusion for the annual girl scout cookie drive, the local girl scout council has pledged to provide a bag containing three money envelopes (each containing $100), three movie ticket envelopes (each containing tickets for a family of four to go to Movies Sixteen) and four food coupon envelopes (each containing coupons for a family of four to go to McDonalds) and the national girl scout council has pledged to

provide a bag containing two money envelopes, three movie ticket envelopes and two food coupon envelopes. At the awards ceremonies for the cookie drive, one of the bags (from one of the councils – the local or the national) will be selected. There is a 35% likelihood that the local council's bag will be selected and a 65% likelihood that the national council's bag will be selected. The winning scout will get to randomly select an envelope out of the selected council's bag.

    a.   What is the likelihood that the randomly selected envelope will be a money envelope?

    b.   What is the likelihood that the randomly selected envelope will be a food envelope?

6.   (18 pts) Consider the contingency table for passenger cars, SUVs and light trucks in use given below, as reported by the Motor Vehicle Manufacturers Association in *Motor Vehicle Facts and Figures*. Frequencies are in millions.

<table>
<tr><td colspan="2"></td><td colspan="5">Age (years)</td><td></td></tr>
<tr><td colspan="2"></td><td>Under 3
(A1)</td><td>3-5
(A2)</td><td>6-8
(A3)</td><td>9-11
(A4)</td><td>12 & over
(A5)</td><td>Total</td></tr>
<tr><td rowspan="4">Type</td><td>Car
(V1)</td><td>15.5</td><td>29.9</td><td>21.2</td><td>17.9</td><td>15.5</td><td>100</td></tr>
<tr><td>SUV
(V2)</td><td>10.5</td><td>14.1</td><td>16.8</td><td>8.4</td><td>10.2</td><td>60</td></tr>
<tr><td>Truck
(V3)</td><td>3.2</td><td>4.2</td><td>4.8</td><td>4.3</td><td>3.5</td><td>20</td></tr>
<tr><td>Total</td><td>29.2</td><td>48.2</td><td>42.8</td><td>30.6</td><td>29.2</td><td>180</td></tr>
</table>

Let E1 be the event that a selected vehicle belongs to either A2 or A3.
Let E2 be the event that a selected vehicle belongs to either V1 or V2.
Let E3 be the event that a selected vehicle belongs to either A2 or V2.

    a.   Find $P(A4)$

    b.   Find $P(V3)$

    c.   Find $P(A2 \cap E2)$

    d.   Find $P(E1 \mid V2)$

    e.   Find $P(E1 \mid E2)$

    f.   Find $P(E1 \cap E3)$

7.   (12 pts) For the above contingency table a digest shows (from repair records) the following probabilities that a SUV will have had a transmission replacement.

<table>
<tr><td colspan="2"></td><td colspan="5">Age (years)</td><td></td></tr>
<tr><td colspan="2"></td><td>Under 3
(A1)</td><td>3-5
(A2)</td><td>6-8
(A3)</td><td>9-11
(A4)</td><td>12 & over
(A5)</td><td>Total</td></tr>
<tr><td>SUV
(V2)</td><td></td><td>10.5</td><td>14.1</td><td>16.8</td><td>8.4</td><td>10.2</td><td>60</td></tr>
<tr><td>Prob. of
Trans.
Repl.</td><td></td><td>0.08</td><td>0.17</td><td>0.35</td><td>0.59</td><td>0.68</td><td></td></tr>
</table>

    a.   If a SUV in use is randomly selected, what is the probability that it will have had a transmission replacement?

    b.   If a selected SUV has had a transmission replacement, what is the probability that the selected SUV came from age group A4?