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. Retain this question sheet for your records.

1.   Consider the two following sample data sets of reaction times (in tenths of a second) from two groups of pilots:

Group A:	8	15	10	13	17	10	9	11	12	15
Group B:	12	7	13	8	14	6	16	7	10	9

   a.   Construct a frequency distribution for all of the data (combine both data sets into one data set).
   b.   From the frequency distribution (obtained in a.) construct a histogram to graphically represent the combined data.
   c.   Find the mean and standard deviation of the grouped data (using the the frequency distribution obtained in a.).

   d.   Contrast, via two dot diagrams plotted on the same graph, the two sample data sets.
   e.   Contrast, via two box plots plotted on the same graph, the two sample data sets.
   f.   Discuss any differences between the two samples data sets which are suggested by the graphs in d. and e.

2.   A carton of 20 rechargeable batteries contains three batteries which are defective.

   a.   In how many ways can an inspector select a sample of four batteries and get (exactly) one of the defective batteries?
   b.   What is the probability that an inspector who selects a sample of four batteries will get (exactly) one of the defective batteries?

3.   In a standard deck of 52 playing cards, the jacks, queens and kings are known as the face cards. All of the other cards are known as the "pips". If five of the cards in such a deck are randomly dealt out to form a hand, what is the probability that the hand will have three pip cards and two face cards?

4.   A hat contains three red balls, two white balls and one blue ball. If two balls are drawn out of the hat in succession (without replacement), what is the probability that they will be the same color?

5.   The probability that the statistics group (in the math department) will be recognized on campus for research contributions to the Tech is 0.24 and the probability that they will be recognized by the American Statistical Association (ASA) for professional contributions is 0.17. The probability that they will receive both awards is 0.04. What is the probability that they will receive (exactly) one of the two awards?

6. Consider the contingency table for passenger cars 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></td><td></td><td colspan="5" align="center">Age (years)</td><td></td></tr>
<tr><td></td><td></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="2">Type</td><td>Car (V1)</td><td>21.5 (A1V1)</td><td>29.9 (A2V1)</td><td>22.2 (A3V1)</td><td>17.9 (A4V1)</td><td>15.4 (A5V1)</td><td>106.9</td></tr>
<tr><td>Truck (V2)</td><td>3.2 (A1V2)</td><td>2.5 (A2V2)</td><td>2.0 (A3V2)</td><td>1.8 (A4V2)</td><td>3.6 (A5V2)</td><td>13.1</td></tr>
<tr><td></td><td>Total</td><td>24.7</td><td>32.4</td><td>24.2</td><td>19.7</td><td>19</td><td>120</td></tr>
</table>

Let E1 be the event that a selected vehicle belongs to either A1 or A2.
Let E2 be the event that a selected vehicle belongs to either A5 or V2.

a. Find P(A2)
b. Find P(V2)
c. Find P(A2V2 | A2)
d. Find P(A2V2 | V2)
e. Find P(E1 ∩ E2)
f. Find P(E1 ∪ E2)

7. For the above contingency table a digest shows (from repair records for passenger cars and light trucks) the following probabilities that a passenger car will have had a transmission replacement.

<table>
<tr><td></td><td colspan="5" align="center">Age (years)</td><td></td></tr>
<tr><td></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>Car (V1)</td><td>21.5 (A1V1)</td><td>29.9 (A2V1)</td><td>22.2 (A3V1)</td><td>17.9 (A4V1)</td><td>15.4 (A5V1)</td><td>106.9</td></tr>
<tr><td>Prob. of Trans. Repl.</td><td>0.09</td><td>0.17</td><td>0.27</td><td>0.52</td><td>0.81</td><td></td></tr>
</table>

a. If a passenger car in use is randomly selected, what is the probability that it will have had a transmission replacement?
b. If a selected passenger car has had a transmission replacement, what is the probability that the selected car came from age group A5?