1. (20 points). Suppose you randomly answer a multiple choice test with 30 questions (each independent of each other). Suppose that each question has five possible answers only one of which is correct. Answer the following:

a. Find the mean and standard deviation for the number of correct answers.
b. What is the probability of answering more than 12 questions correctly?
c. What is the probability of answering less than 15 questions correctly?
d. What is the probability of answering exactly 15 questions correctly?

2. (10 points). Seven chips marked 0, 1, 2, 3, 4, 5, 6 are placed in a box. Two chips are chosen randomly from the box. Let event A be the event that the first chip chosen is odd and event B be the event that the second chip is odd. The first chip is not replaced.

a. Find P(A), P(B) [ extra credit: find P(A or B) and P(A and B) ]

3. (15 points). Seven chips marked 0, 1, 2, 3, 4, 5, 6 are placed in a box. Two chips are chosen randomly from the box. Let event A be the event that the first chip chosen is odd and event B be the event that the second chip is odd. The first chip is replaced.

a. Find P(A), P(B), P(A or B) and P(A and B).

4. (15 points). Two fair six-sided dice are tossed. Event A is the toss of a five on at least one die. Event B is sum of seven on the toss of both die. Find the following:

a. P(A), P(B), P(A|B), P(B|A).
b. Are A and B independent?

5. (30 points). The table below shows the preference of cola of different age groups:

<table>
<thead>
<tr>
<th></th>
<th>Under Age 15</th>
<th>Ages 15-25</th>
<th>Ages 25-35</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cola 1</td>
<td>150</td>
<td>100</td>
<td>200</td>
<td>450</td>
</tr>
<tr>
<td>Cola 2</td>
<td>300</td>
<td>125</td>
<td>200</td>
<td>625</td>
</tr>
<tr>
<td>Cola 3</td>
<td>300</td>
<td>200</td>
<td>300</td>
<td>800</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>750</strong></td>
<td><strong>425</strong></td>
<td><strong>700</strong></td>
<td><strong>1875</strong></td>
</tr>
</tbody>
</table>

a. Find the probability that a randomly chosen person prefers Cola 1.
b. Find the probability that the age of a randomly chosen person is between 15 and 25.
c. Find the probability that the age of a randomly chosen person is between 15 and 35.
d. Find the probability that a randomly chosen person prefers Cola 3 given that the person is between 15 and 25 years old.
e. Find the probability that a randomly chosen person is under 15 years old given that s/he prefers Cola 1.
f. Is the age of individuals and the cola preference independent? Explain using the definition of independence.

6. (10 points). The mean and standard deviation of a random sample of 30 students' IQ at a certain college are 120.3 and 10.5 respectively. Find the 90%, 95% and 99% confidence intervals for the average IQ for all students in the school.