Name: ____________________________

**Instructions.** Complete each of the following nine questions. Please show all appropriate work in your solutions in order to obtain maximum credit. You may use a calculator.

1. (2 pts) For their lunch special, a local pizza shop offers a small pizza and a medium drink. For the pizza you must choose 1 of 3 types cheeses, and 1 of 8 types of toppings; there are 9 flavors of drinks to choose from. In how many ways can you choose a lunch special?

   Ans: ________________

2. (7 pts) In a certain community approximately 25% of senior citizens (65 or older) get the flu each year. However, about 40% of people under 65 get the flu each year. Also, approximately 30% of the community is composed of senior citizens.

   (a) What is the probability a person will get the flu this year given they are a senior citizen?

   Ans: ________________

   (b) What is the probability that a person selected at random from the community is a senior citizen and will get the flu this year?

   Ans: ________________

   (c) What is the probability that a person selected at random from the community is a person under age 65 and will get the flu this year?

   Ans: ________________

   (d) What is the probability that a person selected at random from the community will get the flu this year?

   Ans: ________________

   (e) What is the probability that a person selected at random from the community will get the flu this year or is a senior citizen?

   Ans: ________________

   (f) Are the events an individual is a senior citizen and an individual will get the flu this year independent? Explain.

   (g) Are the events an individual is a senior citizen and an individual will get the flu this year mutually exclusive? Explain.
3. (2 pts) The number of computers per household in a small town is given by

<table>
<thead>
<tr>
<th>Computers</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>20</td>
<td>80</td>
<td>120</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the probability that a randomly selected home in this town has 2 or more computers?

Ans: ________________

4. (4 pts) Compute the expected value and standard deviation for the following discrete random variable.

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>2</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(x)$</td>
<td>.4</td>
<td>.25</td>
<td>.05</td>
<td>.30</td>
</tr>
</tbody>
</table>

Expected Value: ________________

Standard Deviation: ________________

5. (4 pts) In a certain state lottery, there are 54 numbers and players choose any 6 of the 54 numbers. The state then selects 6 of the 54 numbers at random. The winning ticket(s) for the grand prize are those which match the state’s 6 numbers.

(a) In how many ways can 6 numbers be chosen from 54 numbers (order doesn’t matter)?

Ans: ________________

(b) If someone buys one lottery ticket, what is the probability they will win the grand prize?

Ans: ________________

(c) If someone buys 15 tickets lottery tickets, what is the probability they will win the grand prize?

Ans: ________________
6. (6 pts) Suppose a certain type of laser eye surgery has a 93% success rate. Suppose that this surgery is performed on 24 patients and the results are independent of one another.

(a) What is the probability that all 24 of the surgeries will be successful?

Ans: __________

(b) What is the probability that exactly 23 of the surgeries will be successful?

Ans: __________

(c) What is the probability that 23 or fewer of the surgeries will be successful?

Ans: __________

7. (6 pts) In the United States, approximately 38% of all people have blood type O+. Suppose a hospital has collected blood from 350 randomly selected people in the United States.

(a) Find the mean and standard deviation for the number of people out of the 350 that have blood type O+.

Mean: __________
Standard Deviation: __________

(b) Use the normal approximation to the binomial distribution to compute the probability that from 120 to 140 (including 120 and 140) out of the 350 people have blood type O+.

Ans: __________

(c) Explain why you were justified in using the normal approximation to the binomial distribution in part (b).
8. (5 pts) Let \( z \) be the standard normal random variable.

(a) Find \( P(z > -1.32) \)  \textbf{Ans: } \\

(b) Find \( P(-1.32 < z \leq 1.47) \)  \textbf{Ans: } \\

(c) Find \( P(z < 0.56) \)  \textbf{Ans: } \\

(d) Find the \( z \) value so that 75\% of the normal curve lies to the right of \( z \).

\textbf{Ans: } \\

(e) Find the \( z \) value so that 66\% of the normal curve lies between \( z \) and \(-z\)?

\textbf{Ans: } \\

9. (6 pts) Suppose that the weights of adult female hippopotamuses are normally distributed with mean 2500 pounds, and standard deviation 600 pounds. Find

(a) the probability that a randomly selected adult female hippopotamus weighs more than 2100 pounds.

\textbf{Ans: } \\

(b) the probability that a randomly selected adult female hippopotamus weighs between 2100 and 3200 pounds.

\textbf{Ans: } \\

(c) the weight of an adult female hippopotamus who weighs more than 60 percent of all adult female hippopotamuses.

\textbf{Ans: }