In Class Exam 3 Review

1. A medical test for use of a certain drug is positive in 90% of those who use the drug. The test is also positive in 7% of those who do not use the drug. 12% of the people tested use the drug.

   a) What is the probability someone who does not use the drug gets a negative test?

   b) What is the probability someone who gets a positive test uses the drug?

   c) Assuming successive tests are independent, what is the probability someone who gets two positive tests uses the drug?

2. A student takes 12 credits and receives the following grades:

<table>
<thead>
<tr>
<th>grade</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td># credits</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

   a) Find his gpa for the 12 credits.

   b) He previously had 60 credits with a gpa of 2.8. Find his new gpa.

3. I. E and F are two events in a sample space. \( P(E) = 0.7, P(F) = 0.6 \) and \( P(E^C \cap F^C) = 0.1 \).

   a) Are E and F independent?

   b) Find \( P(E|F) \).

   II. If \( P(E) = 0.75, P(F) = 0.8 \) and \( P(E^C \cap F^C) = 0.05 \) are E and F independent? Find \( P(E|F) \).

4. The events that runners I, II and III can run a mile in 4 minutes are independent and have probabilities 0.6, 0.9 and 0.7 respectively.

   a) Find the probability that at least one runner will not run the mile in 4 min.

   b) Find the probability that only runner II will finish in 4 min.
c) Find the probability that runners I or II, possibly both, will finish in 4 min.

5. A die is tossed 3 times.
a) What is the probability that the 2\textsuperscript{nd} toss is a “6” given that there are exactly two “6”s?

b) Are the events that the 2\textsuperscript{nd} toss is a “6” and there are exactly two “6”s independent?

c) Answer a and b if the die is tossed 12 times.

6. Classify each random variable as continuous, infinite discrete or finite.
A coin is randomly selected from a box of coins containing nickels, dimes, quarters and pennies. Then the coin is returned to the box.
a) \(X\) is the money value of the coin.

b) \(Y\) is the un-rounded weight of the person choosing the coin.

c) \(N\) is the number of times a coin must be selected until a nickel is chosen.

7. I A person draws one card from a standard 52-card deck.
a) What are the odds he will select an ace?

b) What are the odds he will not select an ace?

II If the odds in favor of \(E\) are 2:9, find \(P(E^c)\).
8. Classify each random variable as binomial or not. If binomial, give n, p, the mean and the standard deviation. If not binomial, say why not.

a) A shipment contains 100 games, two of which are defective. 10 games are one at a time at different times and X is the number of defective games.

b) Games are continually produced so that 2% are defective. A sample of 10 games are selected at random and X is the number of defective games.

c) 1/3 of the population has blood type A+. Fifty people are selected at random and X is the number who have blood type A+.

d) A box contains 10 red, 6 blue and 4 green balls. Three are randomly selected without replacement. X= the number of green balls chosen.

9. Write the distribution of the random variable in 8d. Find E(X).

10. It is estimated that 6% of a certain population has a certain non-communicable disease. 500 people are randomly selected and X is the number of those selected who have the disease.
a) Find \( P(20 \leq X \leq 30) \).
b) Find \( E(X) = \mu \) and the \( \sigma = \text{st.dev of } X \).
c) Find \( P(\mu-\sigma \leq X \leq \mu+\sigma) \)