

Math 115 - Test 3
November 13, 2014

Name _____

Score _____

Show all work to receive full credit. Supply explanations where necessary.

1. (10 points) Determine whether each statement is true (T) or false (F).

(a) _____ If A and B are any events, then $P(A \cup B) = P(A) + P(B) + P(A \cap B)$.

(b) _____ When two events are mutually exclusive, they have no outcomes in common.

(c) _____ If A and B are independent, then $P(A|B) = P(A)$.

(d) _____ To get the probability of a path in a tree diagram, you add the probabilities along the branches.

(e) _____ Whenever two events are independent, they are also mutually exclusive.

(f) _____ The probability distribution associated with the experiment of rolling a six-sided die is an example of a continuous probability distribution.

(g) _____ The mean (expected value) of a random variable of a probability distribution describes how the outcomes vary.

(h) _____ In most applications, continuous random variables represent measured data, while discrete random variables represent counted data.

(i) _____ The sum of all the probabilities in a discrete probability distribution must be less than one.

(j) _____ If the probability of success in a binomial experiment is $p = 0.64$, then the probability of failure is $q = 0.46$.

2. (2 points) On a single roll of a six-sided die, what is the probability of rolling a two given that you rolled an even number? Give a brief explanation.

3. (8 points) A letter is selected at random from the first box and placed into the second box. Then a letter is selected at random from the second box.

<i>o</i>	<i>o</i>	<i>o</i>	<i>x</i>	<i>x</i>
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<i>o</i>	<i>o</i>	<i>o</i>	<i>o</i>	<i>x</i>	<i>x</i>	<i>x</i>
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- (a) Sketch the complete tree diagram for this experiment. **Include the probability of each path.**

- (b) What is the probability of selecting at least one letter *o*?

- (c) What is the probability of selecting the letter *x* from the second box?

4. (3 points) A math class has 28 students. Of these, 8 students are math majors and 18 students are males. Of the math majors, 6 are males. Find the probability that a randomly selected student is a male or a math major.

5. (3 points) Determine whether the random variable x is discrete or continuous.

(a) Let x represent the volume of Coke in a can of soda.

(b) Let x represent the number of dogs in a household.

(c) Let x represent the number of characters in a text message.

6. (3 points) Consider the following discrete probability distribution.

x	0	1	2	3	4	5	6
$P(x)$	0.5	?	0.23	0.21	0.17	0.11	0.08

(a) Find the missing probability.

(b) Find $P(x > 3)$, that is, the probability that x is greater than 3.

(c) Find $P(x \neq 1)$, that is, the probability that x is not 1.

7. (4 points) Determine if the events are independent or dependent. Give a brief, one-sentence explanation for each.

(a) Selecting a king from a standard deck of playing cards, replacing it, and then selecting a queen from the deck

(b) Rolling a six-sided die and then rolling it a second time so that the sum of the two rolls is five

8. (6 points) The probability distribution for the number of games played in the World series from 1903 to 2012 is shown below.

x	4	5	6	7	8
$P(x)$	0.176	0.241	0.213	0.333	0.037

(a) Find the mean (expected value).

(b) Find the standard deviation.

(c) What is an unusually large number of games in the World Series?

9. (5 points) The numbers of students at a certain college are described in the table below.

	Female	Male
Part-time	2112	1408
Full-time	1746	1164

A college student is selected at random.

- (a) What is the probability that the student is a female?

- (b) What is the probability that the student is a part-time student?

- (c) What is the probability that the student is a female, part-time student?

- (d) What is the probability that the student is a female student or a part-time student?

- (e) What is the probability that the student is a female given that the student is part-time?

10. (6 points) In a certain town, 63% of the children dress as vampires on Halloween. Ten children are randomly selected.

(a) What is the probability that 6 or fewer are dressed as vampires?

(b) What is the probability that more than 6 are dressed as vampires?

(c) How many vampires would you expect in a sample of 10?

(d) In a sample of 10, what would be an unusually small number of vampires?