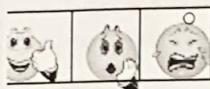


Discrete Math

Unit 5 Objectives

Name _____



Objective #1: Can you distinguish between discrete random variables and continuous random variables?

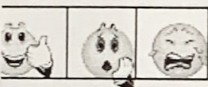
In exercises 1 and 2, decide whether the random variable x is discrete or continuous.

1. x represents the number of motorcycle accidents in one year in California.

discrete

2. x represents the volume of blood drawn for a blood test.

continuous



Objective #2: Can you construct a discrete probability distribution and its graph?

1. Employee Testing

A company gave psychological tests to prospective employees. The random variable x represents the possible test scores. Use the histogram to find the probability that a person selected at random from the survey's sample had a test score of (a) more than two and (b) less than four.

a. more than two

$$0.25 + 0.10 = 0.35$$

b. less than 4

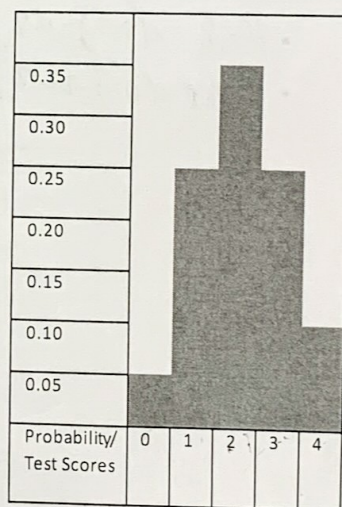
$$1 - P(4)$$

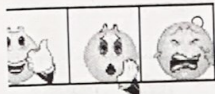
$$1 - .10 = 0.9$$

or

$$0 + 1 + 2 + 3$$

$$0.05 + 0.35 + 0.35 + 0.25 = 0.9$$





Objective #3: Can you determine if a distribution is a probability distribution?

1. **Tires** A mechanic checked the tire pressures on each car that he worked on for one week. The random variable x represents the number of tires that were underinflated.

X	0	1	3	4	5
P(x)	0.30	0.25	0.25	0.15	0.05

Yes all are between 0 + 1
and they add up to 1



Objective #4: Can you find the mean, variance, and standard deviation of a discrete probability distribution?

For exercise 1, (a) use the frequency distribution to construct a probability distribution, find the (b) mean, (c) variance, and (d) standard deviation of the probability distribution, and (e) interpret the results in the context of the real-life situation.

1. The number of dogs per household in a small town

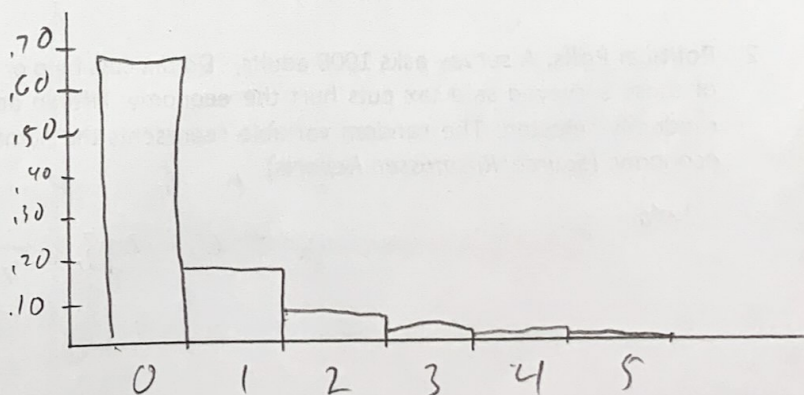
Dogs	0	1	2	3	4	5
Households	1491	425	168	48	29	14

2175

0.6855 0.1954 0.0776 0.0222 0.0134 0.0065

b. $\bar{x} = 0.5074$
 c. $\sigma^2 = 0.8279$
 d. $\sigma = 0.909926$

e. almost 70%
of people have no
dogs in their homes



Discrete
Unit!

Objective #5: Can you find the expected value of a discrete probability distribution?

For exercise 1, use the probability distribution or histogram to find the (a) mean, (b) variance, (c) standard deviation, and (d) expected value of the probability distribution and (e) interpret the results.

1. Students in a class take a quiz with eight questions. The number x of questions answered correctly can be approximated by the following probability distribution

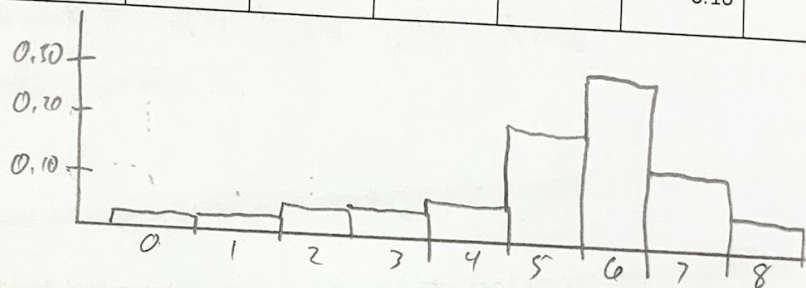
x	0	1	2	3	4	5	6	7	8
$P(x)$	0.02	0.02	0.06	0.06	0.08	0.22	0.30	0.16	0.08

a. $\bar{x} = 5.3$

b. $\sigma^2 = 3.24997$

c. $\sigma = 1.80277$

d. expected value = 5.3



Objective #6: Can you determine if a probability experiment is a binomial experiment?

In exercises 1 and 2, decide whether the experiment is a binomial experiment. If it is, identify a success, specify the values of n , p and q , and list the possible values of the random variable x . If it is not a binomial experiment, explain why.

1. **Cyanosis:** Cyanosis is the condition of having bluish skin due to insufficient oxygen in the blood. About 80% of babies are born with cyanosis recover fully. A hospital is caring for five babies born with cyanosis. The random variable represents the number of babies that recover fully. (Source: The World Book Encyclopedia)

Y/S

$n = 5$ $p = 0.80$ $q = 0.20$

$x = 0, 1, 2, 3, 4, 5$

2. **Political Polls:** A survey asks 1000 adults, "Do tax cuts help or hurt the economy?" Twenty-one percent of those surveyed said tax cuts hurt the economy. Fifteen adults who participated in the survey are randomly selected. The random variable represents the number of adults who think tax cuts hurt the economy. (Source: Rasmussen Reports)

Y/S

$n = 15$ $p = .21$ $q = 0.79$

$x = 0, 1, 2, 3, \dots, 15$



Objective #7: Can you find binomial probabilities using the binomial probability formula?

In exercise 1, find the indicated probabilities. If convenient, use technology to find the probability.

- Answer Guessing:** You are taking a multiple choice quiz that consists of five questions. Each question has four possible answers, only one of which is correct. To complete the quiz, you randomly guess the answer to each question. Find the probability of guessing (a) exactly three questions correctly, (b) at least three answers correctly, and (c) less than three questions correctly.

$$n = 5 \quad p = 0.25 \quad q = 0.75$$

$$a. \text{binompdf}(5, 0.25, 3) = 0.0878$$

$$b. 1 - \text{binomcdf}(5, 0.25, 2) = 0.1035$$

$$c. \text{binomcdf}(5, 0.25, 2) = 0.8964$$



Objective #8: Can you find binomial probabilities using technology and a binomial table?

In exercise 1 and 2, find the indicated probabilities. If convenient, use technology to find the probability.

- Baseball Fans:** Fifty-nine percent of men consider themselves professional baseball fans. You randomly select 10 men and ask each if he considers himself a professional baseball fan. Find the probability that the number who consider themselves baseball fans is (a) exactly eight, (b) at least eight, and (c) less than eight. (Source: Gallup Poll)

$$a. \text{binompdf}(10, .59, 8) = 0.111069 \quad b. 1 - \text{binomcdf}(10, .59, 7)$$

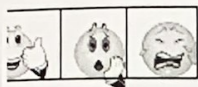
$$c. \text{binomcdf}(10, .59, 7) = 0.8483 \quad = 0.151699$$

- Vacation Purpose:** Twenty-one percent of vacationers say the primary purpose of their vacation is outdoor recreation. You randomly select 10 vacationers and ask each to name the primary purpose of his or her vacation. Find the probability that the number who say outdoor recreation is their primary purpose of their vacation is (a) exactly three, (b) more than three, and (c) at most three. (Source: Travel Industry Association)

$$a. \text{binompdf}(10, .21, 3) = 0.2134168$$

$$b. 1 - \text{binomcdf}(10, .21, 3) = 0.13914$$

$$c. \text{binomcdf}(10, .21, 3) = 0.86085$$



Objective #9: Can you graph a binomial distribution?

On exercises 1 and 2, (a) construct a binomial distribution, (b) graph the binomial distribution using a histogram, (c) describe the shape of the histogram, find the (d) mean, (e) variance, and (f) standard deviation of the binomial distribution, and (g) interpret the results in the context of the real-life situation. What values of the random variable x would you consider unusual? Explain your reasoning.

$$n = 6 \quad p = 0.37 \quad q = 0.63 \quad x = 0, 1, 2, 3, 4, 5, 6$$

1. **Women Baseball Fans:** Thirty-seven percent of women consider themselves professional baseball fans. You randomly select six women and ask each if she considers herself a fan of professional baseball.

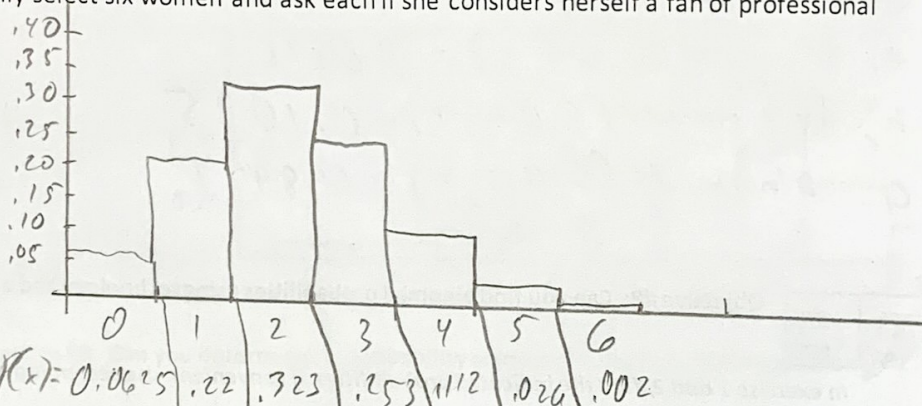
c. right skewed

d. $n \cdot p = 2.22$

e. $\sigma^2 = 1.3986$

f. $\sigma = 1.18$

5, 6 would be unusual



2. **Blood Donors:** Five percent of people in the United States eligible to donate blood actually do. You randomly select four eligible blood donors and ask them if they donate blood. (Adapted from American Association of Blood Banks)

$$n = 4 \quad p = 0.05 \quad q = 0.95 \quad x = 0, 1, 2, 3, 4$$

c. right skewed

d. $n \cdot p = 0.2$

e. $\sigma^2 = n \cdot p \cdot q = 0.19$

f. $\sigma = 0.435$

$$0.2 + 2 \cdot 0.435 = 1.07$$

unusual

2, 3, 4

