Student: ____________________	**Instructor:** Andreas Lazari	**Assignment:** Chapter 6.1-Homework
Date: ____________________	**Course:** Math2620 F - Fall 2018	

1. Determine whether the random variable is discrete or continuous. In each case, state the possible values of the random variable.
(a) The number of free-throw attempts before the first shot is made.
(b) The time it takes to fly from City A to City B.

(a) Is the number of free-throw attempts before the first shot is made discrete or continuous?

- ● **A.** The random variable is discrete. The possible values are $x = 0, 1, 2, \ldots$
- ○ **B.** The random variable is discrete. The possible values are $x \geq 0$.
- ○ **C.** The random variable is continuous. The possible values are $x \geq 0$.
- ○ **D.** The random variable is continuous. The possible values are $x = 0, 1, 2, \ldots$.

(b) Is the time it takes to fly from City A to City B discrete or continuous?

- ○ **A.** The random variable is continuous. The possible values are $t = 1, 2, 3, \ldots$.
- ● **B.** The random variable is continuous. The possible values are $t > 0$.
- ○ **C.** The random variable is discrete. The possible values are $t = 1, 2, 3, \ldots$.
- ○ **D.** The random variable is discrete. The possible values are $t > 0$.

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2. Determine whether the random variable is discrete or continuous. In each case, state the possible values of the random variable.
(a) The number of light bulbs that burn out in the next week in room with 17 bulbs.
(b) The weight of a T-bone steak.

(a) Is the number of light bulbs that burn out in the next week in room with 17 bulbs discrete or continuous?

- ● **A.** The random variable is discrete. The possible values are $x = 0, 1, 2, \ldots, 17$.
- ○ **B.** The random variable is continuous. The possible values are $x = 0, 1, 2, \ldots, 17$.
- ○ **C.** The random variable is continuous. The possible values are $0 \leq x \leq 17$.
- ○ **D.** The random variable is discrete. The possible values are $0 \leq x \leq 17$.

(b) Is the weight of a T-bone steak discrete or continuous?

- ○ **A.** The random variable is continuous. The possible values are $w = 1, 2, 3, \ldots$.
- ○ **B.** The random variable is discrete. The possible values are $w > 0$.
- ● **C.** The random variable is continuous. The possible values are $w > 0$.
- ○ **D.** The random variable is discrete. The possible values are $w = 1, 2, 3, \ldots$.

3. Determine whether the distribution is a discrete probability distribution.

x	P(x)
0	0.15
1	0.34
2	0.27
3	0.13
4	0.11

1 Yes, and all probabilities are between 0 and 1

Is the distribution a discrete probability distribution?

- A. Yes, because the sum of the probabilities is equal to 1.
- B. Yes, because each probability is between 0 and 1, inclusive.
- C. No, because the sum of the probabilities is not equal to 1.
- ● D. Yes, because the sum of the probabilities is equal to 1 and each probability is between 0 and 1, inclusive.

4. Determine whether the distribution is a discrete probability distribution.

x	0	1	2	3	4
P(x)	0.5	0.5	0.5	0.5	0.5

→ the sum is Not equal to 1.

Is the distribution a discrete probability distribution?

- A. No, because each probability is not between 0 and 1, inclusive.
- B. Yes, because the sum of the probabilities is equal to 1 and each probability is between 0 and 1, inclusive
- ● C. No, because the sum of the probabilties is not equal to 1.
- D. Yes, because the sum of the probabilities is equal to 1.

5. Determine whether the distribution is a discrete probability distribution.

x	100	200	300	400	500
P(x)	0.25	0.25	0.25	0.25	0.25

→ the sum is not equal to 1.

Is the distribution a discrete probability distribution?

- A. Yes, because the sum of the probabilities is equal to 1 and each probability is between 0 and 1, inclusive
- B. Yes, because the sum of the probabilities is equal to 1.
- C. No, because each probability is not between 0 and 1, inclusive.
- ● D. No, because the sum of the probabilties is not equal to 1.

6. Determine the required value of the missing probability to make the distribution a discrete probability distribution.

x	P(x)
3	0.19
4	? 0.21
5	0.45
6	0.15

$1-(.19+.45+.15)$
$=1-.79=0.21$

P(4) = 0.21 (Type an integer or a decimal.)

7. The following data represent the number of games played in each series of an annual tournament from 1934 to 2003. Complete parts (a) through (d) below.

x (games played)	4	5	6	7
Frequency	15	13	20	21

= 69 Total

(a) Construct a discrete probability distribution for the random variable x.

x (games played)	P(x)
4	0.2174
5	0.1884
6	0.2899
7	0.3043

(Round to four decimal places as needed.)

$15/69 = 0.2173913 \approx 0.2174$

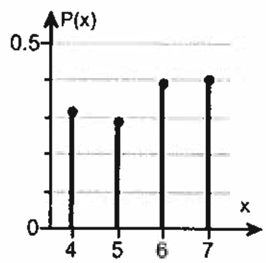
$13/69 = 0.1884057 \approx 0.1884$

$20/69 = 0.289855 \approx 0.2899$

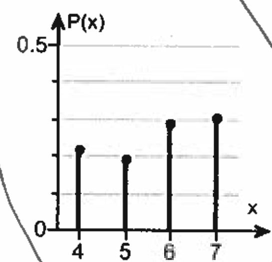
$21/69 = 0.3043478 \approx 0.3043$

(b) Graph the discrete probability distribution. Choose the correct graph below.

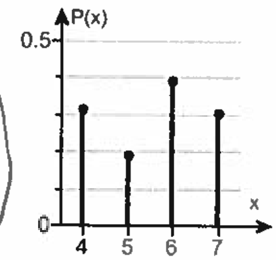
○ A.



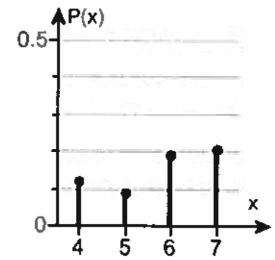
● B.



○ C.



○ D.



(c) Compute and interpret the mean of the random variable x.

μ_x = 5.6811 games

(Round to four decimal places as needed.)

X	P(x)	X·P(x)	$X^2 \cdot P(x)$
4	0.2174	0.8696	3.4784
5	0.1884	0.9420	4.7100
6	0.2899	1.7394	10.4364
7	0.3043	2.1301	14.9107
		5.6811 μ_x	33.5355 $\rightarrow \Sigma X^2 \cdot P(x)$

Interpret the mean of the random variable x.

○ A. The series, if played one time, would be expected to last about 5.7 games.

○ B. The series, if played many times, would be expected to last about 4.3 games, on average.

● C. The series, if played many times, would be expected to last about 5.7 games, on average.

(d) Compute the standard deviation of the random variable x.

σ_x = 1.1 games

(Round to one decimal place as needed.)

$\sigma^2 = \Sigma X^2 \cdot P(x) - (\mu)^2$

$\sigma^2 = 33.5355 - (5.6811)^2$

$\sigma^2 = 1.2606$

$\Rightarrow \sigma = \sqrt{\sigma^2} = \sqrt{1.2606} = 1.12276$

8. The following data represent the number of games played in each series of an annual tournament from 1929 to 2001. Complete parts (a) through (d) below.

x (games played)	4	5	6	7
Frequency	15	11	18	28

(a) Construct a discrete probability distribution for the random variable x.

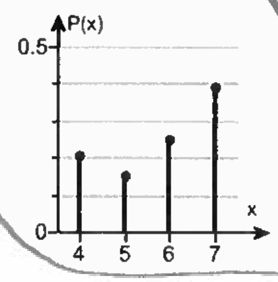
x (games played)	P(x)
4	0.2083
5	0.1528
6	0.2500
7	0.3889

15/72 = 0.208333
11/72 = 0.152778
18/72 = 0.25
28/72 = 0.388889

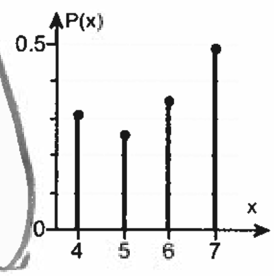
(Round to four decimal places as needed.)

(b) Graph the discrete probability distribution. Choose the correct graph below.

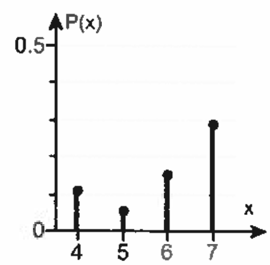
● **A.**



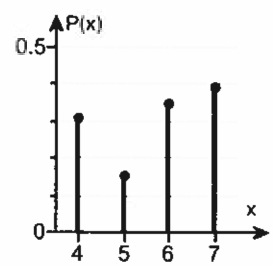
○ **B.**



○ **C.**



○ **D.**



(c) Compute and interpret the mean of the random variable x.

μ_x = 5.8195 games

(Round to four decimal places as needed.)

X	P(X)	X·P(X)	X^2·P(X)
4	0.2083	0.8332	3.3328
5	0.1528	0.764	3.8200
6	0.2500	1.5	9.0000
7	0.3889	2.7223	19.0561
		$\mu_x = 5.8195$	35.2089

Interpret the mean of the random variable x.

○ **A.** The series, if played one time, would be expected to last about 5.8 games.

● **B.** The series, if played many times, would be expected to last about 5.8 games, on average.

○ **C.** The series, if played many times, would be expected to last about 4.2 games, on average.

(d) Compute the standard deviation of the random variable x.

σ_x = 1.2 games

(Round to one decimal place as needed.)

$\sigma^2 = \Sigma x^2 \cdot P(X) - (\mu)^2$

$\sigma^2 = 35.2089 - (5.8195)^2$

$\sigma^2 = 1.34232$

$\sigma = \sqrt{\sigma^2} = \sqrt{1.34232} = 1.158585$

$\sigma \approx 1.2$

9. The accompanying data represent the ideal number of children for a random sample of 900 adults. Complete parts (a) through (d) below.

[1] Click the icon to view the data about ideal numbers of children.

(a) Construct a discrete probability distribution for the random variable x.

x (# of children)	P(x)	
0	.010	9/900
1	.032	29/900
2	.589	530/900
3	.269	242/900
4	.077	69/900
5	.020	18/900
6	0.003	3/900

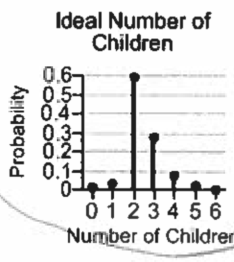
(Round to three decimal places as needed.)

X	freq	P(X)	X · P(X)	$X^2 \cdot P(X)$
0	9	0.010	0	0
1	29	0.032	0.032	0.032
2	530	0.589	1.178	2.356
3	242	0.269	0.807	2.421
4	69	0.077	0.308	1.232
5	18	0.020	0.100	0.500
6	3.	0.003	0.018	0.108
	900		$\mu = 2.443$	6.649

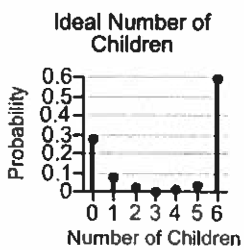
$\Sigma X^2 \cdot P(X)$

(b) Draw a graph of the probability distribution. Choose the correct graph below.

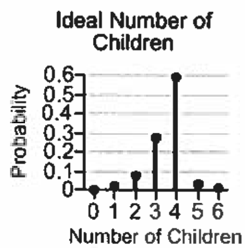
● **A.**



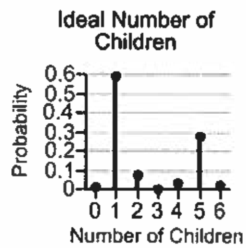
○ **B.**



○ **C.**



○ **D.**



(c) Compute and interpret the mean of the random variable X.

The mean is 2.4 children.
(Round to one decimal place as needed.)

Which of the following interpretations of the mean is correct?

○ **A.** The observed ideal number of children will be less than the mean ideal number of children for most adults.

○ **B.** The observed ideal number of children will be equal to the mean ideal number of children for most adults.

● **C.** If many adults were surveyed, one would expect the mean ideal number of children to be the mean of the random variable.

○ **D.** If any number of adults were surveyed, one would expect the mean ideal number of children to be the mean of the random variable.

(d) Compute the standard deviation of the random variable X.

The standard deviation is 0.8 children.
(Round to one decimal place as needed.)

$$\sigma^2 = \Sigma X^2 \cdot P(X) - (\mu)^2$$
$$= 6.649 - (2.443)^2$$
$$= 0.680751$$

1: Ideal Number of Children Data

$$\sigma = \sqrt{\sigma^2} = \sqrt{0.680751} = 0.825076$$
$$\sigma \approx 0.8$$

x (# of children)	Frequency
0	9
1	29
2	530
3	242
4	69
5	18
6	3

10. Suppose the following data represent the ratings (on a scale from 1 to 5) for a certain smart phone game, with 1 representing a poor rating. Complete parts (a) through (d) below.

Stars	Frequency
1	2797
2	2785
3	4493
4	4523
5	11,257
	25855

(a) Construct a discrete probability distribution for the random variable x.

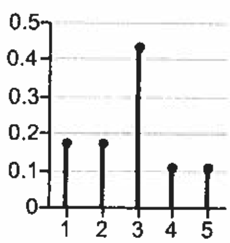
Stars (x)	P(x)	
1	0.108	2797/25855
2	0.108	2785/25855
3	0.174	4493/25855
4	0.175	4523/25855
5	0.435	11257/257

(Round to three decimal places as needed.)

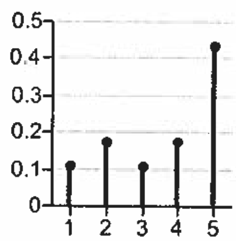
X	P(X)	X·P(X)	X^2·P(x)
1	0.108	0.108	0.108
2	0.108	0.216	0.432
3	0.174	0.522	1.566
4	0.175	0.700	2.800
5	0.435	2.175	10.875
		$E(X)=\mu_X = 3.721$	$15.781 = \Sigma x^2 \cdot P(x)$

(b) Graph the discrete probability distribution. Choose the correct graph below.

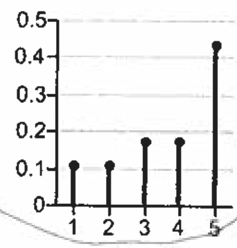
A.



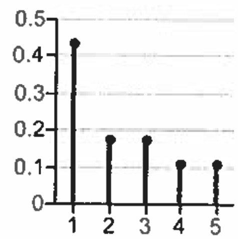
B.



C.



D.



(c) Compute and interpret the mean of the random variable x.

The mean is 3.7 stars.
(Round to one decimal place as needed.)

Which of the following interpretations of the mean is correct?

- A. The observed value of an experiment will be equal to the mean of the random variable in most experiments.
- B. As the number of experiments decreases, the mean of the observations will approach the mean of the random variable.
- C. As the number of experiments increases, the mean of the observations will approach the mean of the random variable.
- D. The observed value of an experiment will be less than the mean of the random variable in most experiments.

(d) Compute the standard deviation of the random variable x.

The standard deviation is 1.4 stars.
(Round to one decimal place as needed.)

$$\sigma^2 = \Sigma x^2 \cdot P(x) - (\mu)^2$$

$$\sigma^2 = 15.781 - (3.721)^2$$

$$\sigma^2 = 1.935159$$

$$\sigma = \sqrt{1.935159} = 1.3911 \approx 1.4$$

11. Suppose a life insurance company sells a $220,000 one-year term life insurance policy to a 21-year-old female for $200. The probability that the female survives the year is 0.999501. Compute and interpret the expected value of this policy to the insurance company.

220000 − 200 = 219800

The expected value is $ 90.22 .
(Round to two decimal places as needed.)

X	P(X)	X·P(X)
−219800	.000499	−109.68
200	0.999501	199.9002

E(X) = μ_X = 90.2

Which of the following interpretation of the expected value is correct?

- ○ **A.** The insurance company expects to make an average profit of $18.17 on every 21-year-old female it insures for 1 month.
- ○ **B.** The insurance company expects to make an average profit of $199.90 on every 21-year-old female it insures for 1 year.
- ● **C.** The insurance company expects to make an average profit of $90.22 on every 21-year-old female it insures for 1 year.
- ○ **D.** The insurance company expects to make an average profit of $8.20 on every 21-year-old female it insures for 1 month.

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12. An investment counselor calls with a hot stock tip. He believes that if the economy remains strong, the investment will result in a profit of $40,000. If the economy grows at a moderate pace, the investment will result in a profit of $10,000. However, if the economy goes into recession, the investment will result in a loss of $40,000. You contact an economist who believes there is a 30% probability the economy will remain strong, a 60% probability the economy will grow at a moderate pace, and a 10% probability the economy will slip into recession. What is the expected profit from this investment?

The expected profit is $ 14000 . (Type an integer or a decimal.)

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13. In the game of roulette, a player can place a $9 bet on the number 15 and have a $\frac{1}{38}$ probability of winning. If the metal ball lands on 15, the player gets to keep the $9 paid to play the game and the player is awarded an additional $315. Otherwise, the player is awarded nothing and the casino takes the player's $9. What is the expected value of the game to the player? If you played the game 1000 times, how much would you expect to lose?

The expected value is $ −0.47 .
(Round to the nearest cent as needed.)

The player would expect to lose about $ 473.68 .
(Round to the nearest cent as needed.)

12.

X	P(X)	X·P(X)
40000	0.3	12000
10000	0.6	6000
−40000	0.1	−4000

μ_X = E(X) = 14000

13.

X	P(X)	X·P(X)
315	$\frac{1}{38}$	8.28947
−9	$\frac{37}{38}$	−8.76315

$\mu_X = E(X) = -0.47368$
≈ -0.47

$1000 \times (-0.47368) = -473.68$

1. A. The random variable is discrete. The possible values are $x = 0, 1, 2, \ldots$.

   B. The random variable is continuous. The possible values are $t > 0$.

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2. A. The random variable is discrete. The possible values are $x = 0, 1, 2, \ldots, 17$.

   C. The random variable is continuous. The possible values are $w > 0$.

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3. D. Yes, because the sum of the probabilities is equal to 1 and each probability is between 0 and 1, inclusive.

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4. C. No, because the sum of the probabilties is not equal to 1.

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5. D. No, because the sum of the probabilties is not equal to 1.

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6. 0.21

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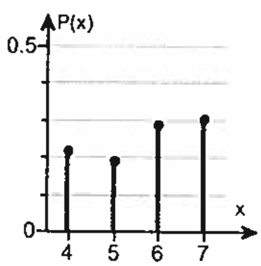
7. 0.2174

   0.1884

   0.2899

   0.3043



B.

5.6812

C. The series, if played many times, would be expected to last about 5.7 games, on average.

1.1

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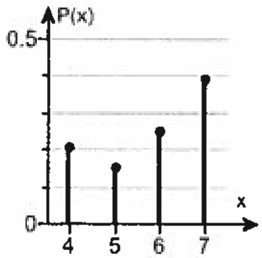
8. 0.2083

0.1528

0.2500

0.3889

A. 

5.8195

B. The series, if played many times, would be expected to last about 5.8 games, on average.

1.2

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9. 0.010

0.032

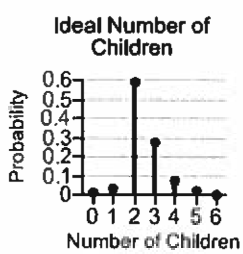
0.589

0.269

0.077

0.020

0.003

A. 

2.4

C.
If many adults were surveyed, one would expect the mean ideal number of children to be the mean of the random variable.

0.8

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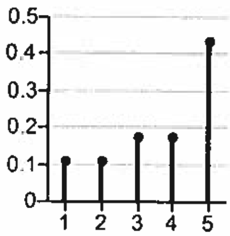
10. 0.108

0.108

0.174

0.175

0.435

C. 

3.7

C.

As the number of experiments increases, the mean of the observations will approach the mean of the random variable.

1.4

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11. 90.22

C.

The insurance company expects to make an average profit of $90.22 on every 21-year-old female it insures for 1 year.

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12. 14,000

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13. −0.47

473.68
