

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Discrete Probability Distributions Worksheet

1. You flip four coins. Let  $X$ , the random variable, be the number of heads on all four coins.

a. List the sample space for the experiment.

b. What are the possible values for  $x$ ?

c. Is the random variable,  $x$ , continuous or discrete?

d. Construct a probability distribution for this experiment.

$X$

$P(X)$

e. Construct a histogram for the probability distribution in the space below.

2. Determine if the following are probability distributions (if no, state why).

a. $X$	3	6	9	12	15
$P(X)$	$4/9$	$2/9$	$1/9$	$1/9$	$1/9$

b. $X$	1	2	3	4	5
$P(X)$	$3/10$	$1/10$	$1/10$	$2/10$	$3/10$

c. $X$	20	30	40	50
$P(X)$	1.1	0.2	0.9	0.3

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3. Determine if the following are discrete or continuous random variables:

- a. The speed of a race car in mph.
- b. The number of cups of coffee that Mrs. Lowery drinks each day.
- c. The number of people that play the SC Lottery each day.
- d. The weight of a rhinoceros.
- e. The time it takes to complete Mrs. Lowery's midterm.
- f. The number of math majors at USC.
- g. The blood pressures of patients at Lexington Medical Center.

4. Construct a probability distribution for the data and draw a histogram for the following:

- a. The probabilities that a patient will have 0, 1, 2, or 3 medical tests performed on entering a hospital are  $\frac{6}{15}$ ,  $\frac{5}{15}$ ,  $\frac{3}{15}$ , and  $\frac{1}{15}$  respectively.

X  
P(X)

- b. A die is loaded in such a way that the probabilities of getting 1, 2, 3, 4, 5, and 6 are  $\frac{1}{2}$ ,  $\frac{1}{6}$ ,  $\frac{1}{12}$ ,  $\frac{1}{12}$ ,  $\frac{1}{12}$ , and  $\frac{1}{12}$  respectively.

X  
P(X)

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c. A box contains 3 \$1 bills, 2 \$5 bills, 1 \$10 bill, and 1 \$20 bill.

X  
P(X)

d. A family has three children. Let X represent the number of boys.

X  
P(X)

5. Below is a probability distribution for the number of math failures of BC students.

X	0	1	2	3	4
P(X)	.41	.38		.08	.02

a.  $P(X = 2)$

b.  $P(X < 2)$

c.  $P(X \leq 2)$

d.  $P(X \leq 1)$

e.  $P(X > 2)$

f.  $P(X = 3 \text{ or } X = 4)$

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### Mean, Variance, and Expectation

1. From past experience, a company has found that in carton of transistors, 92% contain no defective transistors, 3% contain one defective transistor, 3% contain two defective transistors, and 2% contain three defective transistors.

- a. Construct a probability distribution below.

X  
P(X)

- b. Calculate the mean, variance, and standard deviation for the defective transistors.

$$\mu =$$

$$\sigma^2 =$$

$$\sigma =$$

2. The number of suits sold per day at Suit World is shown in the probability distribution below.

X	19	20	21	22	23
P(X)	0.2	0.2	0.3	0.2	0.1

- a. Find the mean, variance, and standard deviation of the distribution.

$$\mu =$$

$$\sigma^2 =$$

$$\sigma =$$

- b. If the manager of Suit World wants to make sure that he has enough suits for the next five days, how many should he buy to stock the store?

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3. The Bank of America VP feels that each savings account customer has, on average, three credit cards. The following distribution represents the number of credit cards people own.

X	0	1	2	3	4
P(X)	0.18	0.44	0.27	0.08	0.03

- a. Find the mean, variance, and standard deviation.

$$\mu =$$

$$\sigma^2 =$$

$$\sigma =$$

- b. Is the VP correct?

4. Rish Florist determines the probabilities for the number of flower arrangements they deliver each day.

X	6	7	8	9	10
P(X)	0.2	0.2	0.3	0.2	0.1

- a. Find the mean, variance, and standard deviation.

$$\mu =$$

$$\sigma^2 =$$

$$\sigma =$$

- b. Approximately how many arrangements should Rish expect to deliver each week?

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### Games & Expectation

1. A box contains ten \$1 bills, five \$2 bills, three \$5 bills, one \$10 bill, and one \$100 bill. A person is charged \$20 to select one bill. Find the expected value for this game. Is this game fair?
2. If a person rolls doubles when he tosses two dice, he wins \$5. The cost to play the game is \$1. Is this game fair?
3. A raffle sells 100 tickets at \$5 a piece. There is one \$500 prize, five \$100 prizes, and ten \$50 prizes.