



Exercises CH5



5-1 , 5-2 , 5-3 , review exercises

- ▶ For Exercises 7 through 12, determine whether the distribution represents a probability distribution. If it does not, state why.

▶ 7-

X	3	6	8	12
P(x)	0.3	0.5	0.7	-0.8

▶ 8-

X	5	7	9
P(x)	0.6	0.8	-0.4

▶ 9-

X	-2	0	2	5
P(x)	0.3	0.4	0.2	0.1



10-

X	20	30	40	50
P(x)	0.05	0.35	0.4	0.2

11-

X	1	2	3	4
P(x)	0.4	0.3	0.2	1

12-

X	3	7	9	12	14
P(x)	4/13	1/13	3/13	1/13	2/13



- ▶ For Exercises 13 through 18, state whether the variable is discrete or continuous.
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- ▶ 13. The number of cheeseburgers a fast-food restaurant serves each day
 - ▶ 14. The number of people who play the state lottery each day
 - ▶ 15. The weight of an automobile
 - ▶ 16. The time it takes to have a medical physical exam
 - ▶ 17. The number of mathematics majors in your school
 - ▶ 18. The blood pressures of all patients admitted to a hospital on a specific day
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- ▶ Defective DVDs From past experience, a company found that in cartons of DVDs, 90% contain no defective DVDs, 5% contain one defective DVD, 3% contain two defective DVDs, and 2% contain three defective DVDs. Find the mean, variance, and standard deviation for the number of defective DVDs.

X	0	1	2	3
P(X)	0.90	0.05	0.03	0.02

$$\mu = \sum X \cdot P(X) =$$

$$= 0(0.90) + 1(0.05) + 2(0.03) + 3(0.02) = 0.17$$

$$\sigma^2 = \sum [X^2 \cdot P(X)] - \mu^2$$

$$= [0^2(0.90) + 1^2(0.05) + 2^2(0.03)$$

$$+ 3^2(0.02)] - (0.17)^2 = 0.35 - 0.0289 = 0.321$$

$$\sigma = \sqrt{0.321} = 0.56$$

5-2

- ▶ Suit Sales The number of suits sold per day at a retail store is shown in the table, with the corresponding probabilities. Find the mean, variance, and standard deviation of the distribution.

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

- ▶ Mean $\mu = \sum X \cdot P(X) =$

$$= 19(0.2) + 20(0.2) + 21(0.3) + 22(0.2) + 23(0.1) = 20.8$$

$$\sigma^2 = \sum [X^2 \cdot P(X)] - \mu^2$$

$$= [19^2(0.2) + 20^2(0.2) + 21^2(0.3) + 22^2(0.2) + 23^2(0.1)] - (20.8)^2$$

$$= 434,2 - 432,64 = 3,56$$

$$\sigma = \sqrt{3,56} = 1,89$$



- ▶ **Lottery Prizes** A lottery offers one \$1000 prize, one \$500 prize, and five \$100 prizes. One thousand tickets are sold at \$3 each. Find the expectation if a person buys one ticket.



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Life Insurance A 35-year-old woman purchases a \$100,000 term life insurance policy for an annual payment of \$360. Based on a period life table for the U.S. government, the probability that she will survive the year is 0.999057. Find the expected value of the policy for the insurance company.

	win	lose
X	360	-99640
P(X)	0.999057	0.000943

$$E(X) = \sum X \cdot P(X)$$

$$360(0.999057) + (-99640)0.000943 = 265.700$$



- ▶ **Rolling Dice** Construct a probability distribution for the sum shown on the faces when two dice are rolled. Find the mean, variance, and standard deviation of the distribution.



- ▶ I. Which of the following are binomial experiments or can be reduced to binomial experiments?
 - a. Surveying 100 people to determine if they like Sudsy Soap
 - b. Tossing a coin 100 times to see how many heads occur
 - c. Drawing a card with replacement from a deck and getting a heart
 - d. Asking 1000 people which brand of cigarettes they smoke
 - e. Testing four different brands of aspirin to see which brands are effective
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▶ 2. Which of the following are binomial experiments or can be reduced to binomial experiments?

a. Testing one brand of aspirin by using 10 people to determine whether it is effective

b. Asking 100 people if they smoke

c. Checking 1000 applicants to see whether they were admitted to White Oak College

d. Surveying 300 prisoners to see how many different crimes they were convicted of

e. Surveying 300 prisoners to see whether this is their first offense



At least X



X, \dots, n

At most X



$0, \dots, X$




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- ▶ 8- Multiple-Choice Exam A student takes a 20-question, multiple-choice exam with five choices for each question and guesses on each question. Find the probability of guessing at least 15 out of 20 correctly. Would you consider this event likely or unlikely to occur?



- ▶ 14. Destination Weddings Twenty-six percent of couples who plan to marry this year are planning destination weddings. In a random sample of 12 couples who plan to marry, find the probability that
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- ▶ a. exactly 6 couples will have a destination wedding
- ▶ b. At least 6 couples will have a destination wedding
- ▶ c. Fewer than 5 couples will have a destination wedding



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- ▶ 22-. Federal Government Employee E-mail Use It has been reported that 83% of federal government employees use e-mail. If a sample of 200 federal government employees is selected, find the mean, variance, and standard deviation of the number who use e-mail.

 - ▶ 24. Alternate Sources of Fuel Eighty-five percent of Americans favor spending government money to develop alternative sources of fuel for automobiles. For a random sample of 120 Americans, find the mean, variance, and standard deviation for the number who favor government spending for alternative fuels.
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- ▶ 30. Job Elimination In a recent year, 13% of businesses have eliminated jobs. If 5 businesses are selected at random, find the probability that at least 3 have eliminated jobs during that year.



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- ▶ For Exercises 1 through 3, determine whether the distribution represents a probability distribution. If it does not, state why.



1.

X	1	2	3	4	5
P(X)	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$

Yes

2.

X	10	20	30
P(X)	0.1	0.4	0.3

No. The sum of the probabilities does not equal 1.



3.

X	1	2	3	4	5
P(X)	$\frac{5}{6}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

No. The sum of the probabilities does not equal 1.



- **8. Customers in a Bank A** bank has a drive-through service. The number of customers arriving during a 15-minute period is distributed as shown. Find the mean, variance, and standard deviation for the distribution

Mean

X	0	1	2	3	4
P(X)	0.12	0.20	0.31	0.25	0.12

$$\mu = \sum X \cdot P(X) =$$

$$= 0(0.12) + 1(0.20) + 2(0.31) + 3(0.25) + 4(0.12) = 2.1$$

$$\sigma^2 = \sum [X^2 \cdot P(X)] - \mu^2$$

$$= [0^2(0.12) + 1^2(0.20) + 2^2(0.31)$$

$$+ 3^2(0.25) + 4^2(0.12)] - (2.1)^2 = 1.4 \quad \sigma = \sqrt{1.4} = 1.2$$

16. Internet Access via Cell Phone Fourteen

percent (14%) of cell phone users use their cell phones to access the Internet. In a random sample of 10 cell phone users, what is the probability that exactly 2 have used their phones to access the Internet? More than 2?

Solution

$$N=10$$

$$P=0.14$$

$$q = 1 - 0.14 = 0.86$$

$$X=2$$

$$P(X = 2) = {}_{10}C_2 \cdot (0.14)^2 \cdot (0.86)^8 = 0.2639$$



- **17. Computer Literacy Test** If 80% of job applicants are able to pass a computer literacy test, find the mean, variance, and standard deviation of the number of people who pass the examination in a sample of 150 applicants.

Solution :

$$P=0.80$$

$$q=0.20$$

$$n=150$$

Mean=

$$n.p= 150.(0.80)=120$$

Variance

$$=n.p.q= 150.(0.80).(0.20)=24$$

standard deviation =

$$\sqrt{n.p.q} = \sqrt{24} = 4.89$$



