Exercises for Chapter 5

**1)** A concerned parents group determined the number of commercials shown in each of five children’s programs over a period of time. Find the mean, variance, and standard deviation for the distribution shown.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of Commercials *X* | 5 | 6 | 7 | 8 | 9 |
| Probability | 0.2 | 0.25 | 0.38 | 0.10 | 0.07 |

**2)** The following distribution shows the number of students enrolled in CPR classes offered by the local fire department. Find the mean, variance, and standard deviation for the distribution.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of students *X* | 12 | 13 | 14 | 15 | 16 |
| Probability | 0.15 | 0.20 | 0.38 | 0.18 | 0.09 |

**3)** A lottery offers one $1000 prize, one $500 prize, and five $100 prizes. One thousand are sold at $3 each. Fine the expectation if a person buys one ticket. (Answer: -1$)

**4)** For a daily lottery, a person selects a three digit number. If a person plays for one dollar, she can win $500. Find the expectation. (Answer: -$0.5)

**5)** Compute the probability of *X* successes,

a. 

b. 

c. 

d. 

e. 

*Assume all variables are binomial.*

**6)** A student takes a 10-question, true/false exam and guesses on each question. Find the probability of passing if the lowest passing grade is 6 correct out of 10. Based on your answer, would it be a good idea not to study and to depend on guessing? (0.377).

**7)**In a survey, 30% of the people interviewed said that they bought most of their books during the last 3 months of the year (October, November, December). If 9 people are selected at random, find the probability that exactly 3 of these people bought most of their books during October, November, and December. (0.267)

**8)** In a survey, three of four students said the courts show too much concern for criminals. Find the probability that at most three out of seven randomly selected students will agree with this statement. (0.071)

**9)** R. H. Bruskin Associates Market Research found that 40% of American do not think that having a college education is important to succeed in the business world. If a random sample of five Americans is selected, find these probabilities

1. Exactly two people will agree with that statement.(0.346)
2. At most three people will agree with that statement.(0.913)
3. At least two people will agree with that statement.(0.663)
4. Fewer than three people will agree with that statement.(0.683)

**10)** Fine the mean, variance, and standard deviation for each of the values of *n* and *p* when the conditions for the binomial distribution are met

a.  b.  c. 

d.  e. .

**11)** A study found that 1% of Social Security recipients are too young to vote. If 800 Social Security recipients are randomly selected, find the mean, variance, and standard deviation of the number of recipients who are too young to vote. (8; 7.9; 2.8)

**12)** If 2% of automobile carburetors are defective, find the mean, variance, and standard deviation of a lot of 500 carburetors. (10; 9.8; 3.1)

**13)** A survey found that 25% of pet owners had their pets bathed professionally rather than doing it themselves. If 18 pet owners are randomly selected, find the probability that exactly five people have their pets bathed professionally. (0.199).

**14)** A survey found that 21 % of Americans watch fireworks on television on July 4. Find the mean, variance, and standard deviation of the number of individuals who watch fireworks on television on July 4 if a random sample of 1000 Americans is selected. (210; 165.9; 12.9)

**15)** One out of every three Americans believes that the U.S11 government should take “primary responsibility” for eliminating poverty in the United States. If 10 Americans are selected, find the probability that at most 3 will believe that the U.S. government should take primary responsibility for eliminating poverty.

1. In the past year, 13% of businesses have eliminated jobs. If five businesses are selected at random, find the probability that at least three have eliminated jobs during the last year.
2. Find each probability 

a/.  b/.  c/. d/.

1. A recent study of robberies for a certain geographic region showed an average of one robbery per 20,000 people. In a city of 80,000 people, find the probability of the following.

a. No robberies   
b. One robbery

c. Two robberies   
d. Three or more robberies

**19)** A telephone-soliciting company obtains an average of   
five orders per 1000 solicitations. If the company reaches   
250 potential customers find the probability of obtaining at least two orders.

1. A videotape has an average of one defect every 1000 feet. Find the probability of at least one defect in 3000 feet. (Answer: 0.9502)
2. The average number of phone inquiries per day at the poison control center is four. Find the probability it will receive five calls on a given day. Use the Poisson approximation.(Answer: 0.1563)
3. In a camping club of 1 8 members, nine prefer hoods and nine prefer hats and earmuffs. On a recent winter outing attended by six members, find the probability that exactly three members wore earmuffs and hats. (Answer: 0.38)
4. Shirts are packed at random in two sizes, regular and extra large. Four shirts are selected from a box of 24 and checked for size. If there are 15 regular shirts in the box, find the probability that all 4 will be regu1ar size. (Answer: 0.13)
5. A shipment of 24 electric typewriters is rejected if 3 are checked for defects and at least 1 is found to be defective. Find the probability that the shipment will be returned if there are actually 6 typewriters that are defective. (Answer: 0.597)
6. Find the area under the normal distribution curve

**a.** Between and  **b.** Between and 

**c.** Between  **d.** Between 

**e.** To the right of  **f.**  To the left of 

**g.** Between  **h.** Between 

**i.** Between  **j.** To the left of 

**k.** To the left of  **l.** To the right of 

**m.** To the left of and to the right of 

25) Find the probabilities for each using the standard normal distribution

**a.  b.**  **c. **

**d.  e.  f. **

**g h.  i. **

**J.  k.  l. **

**m.** 

26) Find the *z* value to the right of the mean so that

1. 53.98% of the area under the distribution curve lies to the left of it.
2. 71.90% of the area under the distribution curve lies to the left of it.
3. 96.78% of the area under the distribution curve lies to the left of it.

27) Find the *z* value to the left of the mean so that

1. 98.87% of the area under the distribution curve lies to the right of it.
2. 82.12% of the area under the distribution curve lies to the right of it.
3. 60.64% of the area under the distribution curve lies to the right of it.

28) Find two *z* values, one positive and one negative, so that the areas in the two tails total the following values:

**a.** 5% **b.** 10% **c.** 1%

29) The average admission charge for a movie is $5.39. If the distribution of admission charges is normal with a standard deviation of $0.79, what is the probability that a randomly selected admission charge is less than $3.00? ( Answer: 0.0012)

30) The average salary for first-year teachers is $27989. If the distribution is approximately normal with , what is the probability that a randomly selected first-year teacher makes these salaries?

1. Between $20000 and $30000 a year?
2. Less than $20000 a year.

31) The average daily jail population in the United States is 618319. If the distribution is normal and the standard deviation is 50,200, find the probability that on a randomly selected day the jail population is

1. Greater than 700000
2. Between 500000 and 600000

( answer: a/. 0.0516 b/. 0.3505)

32) The average number of calories in a 1.5-ounce chocolate bar is 225. Suppose that the distribution of calories is approximately normally distributed with. Find the probability that a randomly selected chocolate bar will have

1. Between 200 and 220 calories.
2. Less than 200 calories.

(Answer: a/. 0.3023 b/. 0.6915)

33)The average salary for a Queens College full professor is $85900. If the average salaries are normally distributed with a standard deviation of $11000, find these probabilities

1. The professor makes more than $90000.
2. The professor makes more than $75000.

(Answer: a. 0.3557, b. 0.8389)

34)The average time for a courier to travel from Pittsburgh to Harrisburg is 200 minutes, and the standard deviation is 10 minutes. If one of these trips is selected at random, find the probability that the courier will have the following travel time. Assume the variable is normally distributed.

1. At least 180 minutes.
2. At most 205 minutes.

(Answer: a. 0.9772 b. 0.6915)

35) The average credit card dept for college seniors is $3262. If the dept is normally distributed with standard deviation of $1100, find these probabilities

1. That the senior owes at least $1000.
2. That the senior owes more than $4000.
3. That the senior owes between $3000 and $4000

(Answer: a/. 0.9803 b/. 0.2514 c/. 0.3434)

36) A brisk walk at 4 miles per hour burns an average of 300 calories per hour. If the standard deviation of the distribution is 8 calories, find the probability that a person who walks 1 hour at the rate of 4 miles per hour will burn these calories. Assume the variable is normally distributed.

1. More than 280 calories.
2. Less than 293 Calories
3. Between 285 and 320 calories.

37) If the systolic blood pressure for a certain group of obese people has a mean of 132 and a standard deviation of 8, find the probability that a randomly selected obese person will have these blood pressures. Assume the variable is normally distributed.

1. Above 130
2. Below 140
3. Between 131 and 136

38) The score on a test have a mean of 100 and a standard deviation of 15. If a personnel manager wishes to select from the top 75% of applicants who take the test, find the cut-off score. Assume the variable is normally distributed. (Answer: 89.95)

39) A contractor decided to build homes that that will include the middle 80% of the market. If the average size (in square feet) of homes built is 1810, find the maximum and minimum sizes of the homes the contractor should build. Assume that the standard deviation is 92 square feet and the variable is normally distributed. (Answer: 1692.24-1927.76)

40) The average price of personal computer (PC) is $949. If the computer prices are approximately normally distributed and, what is the probability that a randomly selected PC costs more than $1200? The least expensive 10% of personal computers cost less than what amount?

42) An automobile dealer finds that the average price of a previously owned vehicle is $8256. He decides to sell cars that will appeal to the middle 60% of the market in terms of price. Find the maximum and minimum prices of the cars and dealer will sell. The standard deviation is $1150, and the variable is normally distributed.

43) The average length of a hospital stay is 5.9 days. If we assume a normal distribution and a standard deviation of 1.7 days, 15% of hospital stays are less than how many days? Twenty-five percent of hospital stays are longer than how many days?

1. An advertising company plans to market a product to low-income families. A study states tat or a particular area, the average income per family is $24596 and the standard deviation is $6256. If the company plans to target the bottom 18% of the families based on income, find the cut-off income. Assume the variable is normally distributed.
2. The mean lifetime of a wristwatch is 25 months, with standard deviation of 5 months. If the distribution is normal, for how many months should a guarantee be made if the manufacture does not want to exchange more than 10% of the watches? Assume the variable is normally distributed.
3. In a certain normal distribution, 1.25% of the area lies to the left 42 and 1% of the area lies to the right of 48. Find.
4. Use the normal approximation to the binomial to find the probabilities for the specific values of *X.*

a.  (Ans: 0.0811) b. 

c.  d. (Ans: 0.1711)

e.  (0.2327) f. 

1. Two out of five adult smokers acquired the habit by age 14. If 400 smokers are randomly selected, find the probability that 170 or more acquired the habit by age 14.
2. The percentage of Americans 25 years or older who have at least some college education is 50.9%. In a random sample of 300 Americans 25 years old and older, what is the probability that more than 175 have at least some college education? (ans:0.0043)
3. The percentage of female Americans 25 years old and older that have completed 4 years of college or more is 23.6%. In a random sample of 180, what is the probability that more than 50 have completed 4 years of college or more? (0.0793)
4. Political candidate estimates that 30% of the voters in his party favour his proposed tax reform bill. If there are 400 people at a rally, find the probability that at least 100 favour his tax bill. (ans:0.9875)