



CONTINUOUS PROBABILITY DISTRIBUTIONS

MULTIPLE CHOICE QUESTIONS

1. For a continuous random variable x , the probability density function $f(x)$ represents
 - a. the probability at a given value of x
 - b. the area under the curve at x
 - c. the area under the curve to the right of x
 - d. the height of the function at x
2. The uniform probability distribution is used with
 - a. a continuous random variable
 - b. a discrete random variable
 - c. a normally distributed random variable
 - d. any random variable, as long as it is not nominal
3. For the standard normal probability distribution, the area to the left of the mean is
 - a. -0.5
 - b. 0.5
 - c. any value between 0 to 1
 - d. 1
4. A uniform probability distribution is a continuous probability distribution where the probability that the random variable assumes a value in any interval of equal length is
 - a. different for each interval
 - b. the same for each interval
 - c. at least one
 - d. None of these alternatives is correct.
5. The function that defines the probability distribution of a continuous random variable is a
 - a. normal function

- b. uniform function
 - c. either normal or uniform depending on the situation
 - d. probability density function
6. The exponential probability distribution is used with
- a. a discrete random variable
 - b. a continuous random variable
 - c. any probability distribution with an exponential term
 - d. an approximation of the binomial probability distribution
7. Consider a binomial probability experiment with $n = 3$ and $p = 0.1$. Then, the probability of $x = 0$ is
- a. 0.0000
 - b. 0.0001
 - c. 0.001
 - d. 0.729
8. For a normal distribution, a negative value of z indicates
- a. a mistake has been made in computations, because z is always positive
 - b. the area corresponding to the z is negative
 - c. the z is to the left of the mean
 - d. the z is to the right of the mean
9. The mean of a standard normal probability distribution
- a. is always equal to zero
 - b. can be any value as long as it is positive
 - c. can be any value
 - d. is always greater than zero
10. The standard deviation of a standard normal distribution
- a. is always equal to zero
 - b. is always equal to one
 - c. can be any positive value
 - d. can be any value
11. A normal probability distribution
- a. is a continuous probability distribution
 - b. is a discrete probability distribution
 - c. can be either continuous or discrete
 - d. must have a standard deviation of 1
12. A continuous random variable may assume
- a. all values in an interval or collection of intervals
 - b. only integer values in an interval or collection of intervals
 - c. only fractional values in an interval or collection of intervals

- d. all the positive integer values in an interval
13. A continuous random variable is uniformly distributed between a and b. The probability density function between a and b is
- a. zero
 - b. $(a - b)$
 - c. $(b - a)$
 - d. $1/(b - a)$
14. If the mean of a normal distribution is negative,
- a. the standard deviation must also be negative
 - b. the variance must also be negative
 - c. a mistake has been made in the computations, because the mean of a normal distribution can not be negative
 - d. None of these alternatives is correct.
15. For a standard normal distribution, the probability of $z \leq 0$ is
- a. zero
 - b. -0.5
 - c. 0.5
 - d. One
16. The highest point of a normal curve occurs at
- a. one standard deviation to the right of the mean
 - b. two standard deviations to the right of the mean
 - c. approximately three standard deviations to the right of the mean
 - d. the mean
17. A standard normal distribution is a normal distribution
- a. with a mean of 1 and a standard deviation of 0
 - b. with a mean of 0 and a standard deviation of 1
 - c. with any mean and a standard deviation of 1
 - d. with any mean and any standard deviation
18. Z is a standard normal random variable. The $P(1.20 \leq Z \leq 1.85)$ equals
- a. 0.4678
 - b. 0.3849
 - c. 0.8527
 - d. 0.0829
19. Z is a standard normal random variable. The $P(-1.20 \leq Z \leq 1.50)$ equals
- a. 0.0483
 - b. 0.3849
 - c. 0.4332

d. 0.8181

20. Given that Z is a standard normal random variable, what is the probability that $-2.51 \leq Z \leq -1.53$?

- a. 0.4950
- b. 0.4370
- c. 0.0570
- d. 0.9310

21. Given that Z is a standard normal random variable, what is the probability that $Z \geq -2.12$?

- a. 0.4830
- b. 0.9830
- c. 0.017
- d. 0.966

22. Given that Z is a standard normal random variable, what is the probability that $-2.08 \leq Z \leq 1.46$?

- a. 0.9091
- b. 0.4812
- c. 0.4279
- d. 0.0533

23. Z is a standard normal random variable. The $P(1.41 \leq Z \leq 2.85)$ equals

- a. 0.4978
- b. 0.4207
- c. 0.9185
- d. 0.0771

24. X is a normally distributed random variable with a mean of 8 and a standard deviation of 4. The probability that X is between 1.48 and 15.56 is

- a. 0.0222
- b. 0.4190
- c. 0.5222
- d. 0.9190

25. X is a normally distributed random variable with a mean of 5 and a variance of 4. The probability that X is greater than 10.52 is

- a. 0.0029
- b. 0.0838
- c. 0.4971
- d. 0.9971

26. X is a normally distributed random variable with a mean of 12 and a standard

deviation of 3. The probability that X equals 19.62 is

- a. 0.000
- b. 0.0055
- c. 0.4945
- d. 0.9945

27. X is a normally distributed random variable with a mean of 22 and a standard deviation of 5. The probability that X is less than 9.7 is

- a. 0.000
- b. 0.4931
- c. 0.0069
- d. 0.9931

28. Given that Z is a standard normal random variable, what is the value of Z if the area to the right of Z is 0.5?

- a. 0.0000
- b. 1.0000
- c. 0.1915
- d. 0.3413

29. Given that Z is a standard normal random variable, what is the value of Z if the area to the left of Z is 0.0559?

- a. 0.4441
- b. 1.59
- c. 0.0000
- d. 1.50

30. An exponential probability distribution

- a. is a continuous distribution
- b. is a discrete distribution
- c. can be either continuous or discrete
- d. must be normally distributed

31. Z is a standard normal random variable. What is the value of Z if the area to the right of Z is 0.1112?

- a. 0.3888
- b. 1.22
- c. 2.22
- d. 3.22

32. Z is a standard normal random variable. What is the value of Z if the area between -Z and Z is 0.754?

- a. 0.377
- b. 0.123
- c. 2.16
- d. 1.16

33. Z is a standard normal random variable. What is the value of Z if the area to the right of Z is 0.9803?
- a. -2.06
 - b. 0.4803
 - c. 0.0997
 - d. 3.06
34. For a standard normal distribution, the probability of obtaining a z value between -2.4 to -2.0 is
- a. 0.4000
 - b. 0.0146
 - c. 0.0400
 - d. 0.5000
35. For a standard normal distribution, the probability of obtaining a z value of less than 1.6 is
- a. 0.1600
 - b. 0.0160
 - c. 0.0016
 - d. 0.9452
36. For a standard normal distribution, the probability of obtaining a z value between -1.9 to 1.7 is
- a. 0.9267
 - b. 0.4267
 - c. 1.4267
 - d. 0.5000
37. Z is a standard normal random variable. The $P(1.05 \leq Z \leq 2.13)$ equals
- a. 0.8365
 - b. 0.1303
 - c. 0.4834
 - d. 0.3531
38. Z is a standard normal random variable. The $P(Z \geq 2.11)$ equals
- a. 0.4821
 - b. 0.9821
 - c. 0.5
 - d. 0.0174
39. Z is a standard normal random variable. The $P(1.5 \leq Z \leq 1.09)$ equals
- a. 0.4322
 - b. 0.3621
 - c. 0.7953
 - d. 0.0711

40. Given that Z is a standard normal random variable. What is the value of Z if the area to the left of Z is 0.9382?
- a. 1.8
 - b. 1.54
 - c. 2.1
 - d. 1.77
41. Given that Z is a standard normal random variable. What is the value of Z if the area to the right of Z is 0.1401?
- a. 1.08
 - b. 0.1401
 - c. 2.16
 - d. -1.08
42. Given that Z is a standard normal random variable. What is the value of Z if the area between $-Z$ and Z is 0.754?
- a. ± 1.16
 - b. ± 1.96
 - c. ± 2.0
 - d. ± 11.6
43. Given that Z is a standard normal random variable, what is the value of Z if the area to the right of Z is 0.9834?
- a. 0.4834
 - b. -2.13
 - c. +2.13
 - d. zero
44. Given that Z is a standard normal random variable, what is the value of Z if the area to the left of Z is 0.119?
- a. 0.381
 - b. +1.18
 - c. -1.18
 - d. 2.36
45. Given that Z is a standard normal random variable, what is the value of Z if the area between $-Z$ and Z is 0.901?
- a. 1.96
 - b. -1.96
 - c. 0.4505
 - d. ± 1.65

PROBLEMS

1. The average price of personal computers manufactured by MNM Company is \$1,200 with a standard deviation of \$220. Furthermore, it is known that the computer prices manufactured by MNM are normally distributed. DO NOT ROUND YOUR NUMBERS.
 - a. What is the probability that a randomly selected computer will have a price of at least \$1,530?
 - b. Computers with prices of more than \$1,750 receive a discount. What percentage of the computers will receive the discount?
 - c. What are the minimum and the maximum values of the middle 95% of computer prices?
 - d. If 513 of the MNM computers were priced at or below \$647.80, how many computers were produced by MNM?

Answers:

- a. 0.0668
 - b. 0.62%
 - c. Minimum Price: 768.80
Maximum Price: 1631.20
 - d. 85,500
2. A professor at a local university noted that the grades of her students were normally distributed with a mean of 73 and a standard deviation of 11. DO NOT ROUND YOUR NUMBERS.
 - a. The professor has informed us that 7.93 percent of her students received grades of A. What is the minimum score needed to receive a grade of A?
 - b. Students who made 57.93 or lower on the exam failed the course. What percent of students failed the course?
 - c. If 69.5 percent of the students received grades of C or better, what is the minimum score of those who received C's?

Answers:

- a. 88.51
 - b. 8.53%
 - c. 67.39
3. The time it takes to hand carve a guitar neck is uniformly distributed between 110 and 190 minutes.
 - a. What is the probability that a guitar neck can be carved between 95 and 165 minutes?
 - b. What is the probability that the guitar neck can be carved between 120 and 200 minutes?
 - c. Determine the expected completion time for carving the guitar neck.
 - d. Compute the standard deviation.

Answers:

- a. .6875
- b. .875
- c. 150
- d. 23.09

4. Scores on a recent national statistics exam were normally distributed with a mean of 80 and a standard deviation of 6.
- a. What is the probability that a randomly selected exam will have a score of at least 71?
 - b. What percentage of exams will have scores between 89 and 92?
 - c. If the top 2.5% of test scores receive merit awards, what is the lowest score eligible for an award?
 - d. If there were 334 exams with scores of at least 89, how many students took the exam?

Answers:

- a. .9332
- b. .04
- c. 91.76
- d. 5000

5. The average starting salary of this year's MBA students is \$35,000 with a standard deviation of \$5,000. Furthermore, it is known that the starting salaries are normally distributed. What are the minimum and the maximum starting salaries of the middle 95% of MBA graduates?

Answer:

Min. = 25,200; Max. = 44,800

6. The average starting salary for this year's graduates at a large university (LU) is \$20,000 with a standard deviation of \$8,000. Furthermore, it is known that the starting salaries are normally distributed.
- a. What is the probability that a randomly selected LU graduate will have a starting salary of at least \$30,400?
 - b. Individuals with starting salaries of less than \$15,600 receive a low income tax break. What percentage of the graduates will receive the tax break?
 - c. What are the minimum and the maximum starting salaries of the middle 95% of the LU graduates?
 - d. If 189 of the recent graduates have salaries of at least \$32,240, how many students graduated this year from this university?

Answers:

- a. 0.0968
- b. 29.12
- c. 35,680
- d. 3000

7. "DRUGS R US" is a large manufacturer of various kinds of liquid vitamins. The quality control department has noted that the bottles of vitamins marked 6 ounces vary in content with a standard deviation of 0.3 ounces. Assume the contents of the bottles are normally distributed.
- What percentage of all bottles produced contains more than 6.51 ounces of vitamins?
 - What percentage of all bottles produced contains less than 5.415 ounces?
 - What percentage of bottles produced contains between 5.46 to 6.495 ounces?
 - Ninety-five percent of the bottles will contain at least how many ounces?
 - What percentage of the bottles contains between 6.3 and 6.6 ounces?

Answers:

- 4.46%
- 2.56%
- 91.46%
- 5.5065 ounces
- 13.59%

8. The Globe Fishery packs shrimp that weigh more than 1.91 ounces each in packages marked "large" and shrimp that weigh less than 0.47 ounces each into packages marked "small"; the remainder are packed in "medium" size packages. If a day's catch showed that 19.77 percent of the shrimp were large and 6.06 percent were small, determine the mean and the standard deviation for the shrimp weights. Assume that the shrimps' weights are normally distributed.

Answer:

Mean = 1.4 Standard deviation = 0.6

9. The monthly earnings of computer programmers are normally distributed with a mean of \$4,000. If only 1.7 percent of programmers have monthly incomes of less than \$2,834, what is the value of the standard deviation of the monthly earnings of the computer programmers?

Answer:

\$550

10. A major department store has determined that its customers charge an average of \$500 per month, with a standard deviation of \$80. Assume the amounts of charges are normally distributed.
- What percentage of customers charges more than \$380 per month?
 - What percentage of customers charges less than \$340 per month?
 - What percentage of customers charges between \$644 and \$700 per month?

Answers:

- 93.32%

- b. 2.28%
 - c. 2.97%
11. The First National Mortgage Company has noted that 6% of its customers pay their mortgage payments after the due date.
- a. What is the probability that in a random sample of 150 customers 7 will be late on their payments?
 - b. What is the probability that in a random sample of 150 customers at least 10 will be late on their payments?

Answers:

- a. 0.1066
- b. 0.4325

12. The salaries of the employees of a corporation are normally distributed with a mean of \$25,000 and a standard deviation of \$5,000.
- a. What is the probability that a randomly selected employee will have a starting salary of at least \$31,000?
 - b. What percentage of employees has salaries of less than \$12,200?
 - c. What are the minimum and the maximum salaries of the middle 95% of the employees?
 - d. If sixty-eight of the employees have incomes of at least \$35,600, how many individuals are employed in the corporation?

Answers:

- a. 0.1151
- b. 0.52%
- c. minimum = \$15,200 maximum = \$34,800
- d. 4,000

13. A manufacturing process produces items whose weights are normally distributed. It is known that 22.57% of all the items produced weigh between 100 grams up to the mean and 49.18% weigh from the mean up to 190 grams. Determine the mean and the standard deviation.

Answer:

standard deviation = 30 mean = 113

14. The daily dinner bills in a local restaurant are normally distributed with a mean of \$28 and a standard deviation of \$6.
- a. What is the probability that a randomly selected bill will be at least \$39.10?
 - b. What percentage of the bills will be less than \$16.90?
 - c. What are the minimum and maximum of the middle 95% of the bills?
 - d. If twelve of one day's bills had a value of at least \$43.06, how many bills did the restaurant collect on that day?

Answers:

- a. 0.0322
- b. 0.0322
- c. minimum = \$16.24 maximum = \$39.06
- d. 2,000

15. The price of a bond is uniformly distributed between \$80 and \$85.
- a. What is the probability that the bond price will be at least \$83?
 - b. What is the probability that the bond price will be between \$81 to \$90?
 - c. Determine the expected price of the bond.
 - d. Compute the standard deviation for the bond price.

Answers:

- a. 0.4
- b. 0.8
- c. \$82.50
- d. \$1.44

16. The price of a stock is uniformly distributed between \$30 and \$40.
- a. What is the probability that the stock price will be more than \$37?
 - b. What is the probability that the stock price will be less than or equal to \$32?
 - c. What is the probability that the stock price will be between \$34 and \$38?
 - d. Determine the expected price of the stock.
 - e. Determine the standard deviation for the stock price.

Answers:

- a. 0.3
- b. 0.2
- c. 0.4
- d. \$35
- e. \$2.89

17. A random variable X is uniformly distributed between 45 and 150.
- a. Determine the probability of $X = 48$.
 - b. What is the probability of $X \leq 60$?
 - c. What is the probability of $X \geq 50$?
 - d. Determine the expected value of X and its standard deviation.

Answers:

- a. 0.000
- b. 0.1429
- c. 0.9524
- d. 97.5, 30.31

18. The length of time patients must wait to see a doctor in a local clinic is uniformly

distributed between 15 minutes and 2 1/2 hours.

- a. What is the probability of a patient waiting exactly 50 minutes?
- b. What is the probability that a patient would have to wait between 45 minutes and 2 hours?
- c. Compute the probability that a patient would have to wait over 2 hours.
- d. Determine the expected waiting time and its standard deviation.

Answers:

- a. 0.000
- b. 0.556
- c. 0.222
- d. 82.5, 38.97

19. The monthly income of residents of Daisy City is normally distributed with a mean of \$3000 and a standard deviation of \$500.
- a. The mayor of Daisy City makes \$2,250 a month. What percentage of Daisy City's residents has incomes that are more than the mayor's?
 - b. Individuals with incomes of less than \$1,985 per month are exempt from city taxes. What percentage of residents is exempt from city taxes?
 - c. What are the minimum and the maximum incomes of the middle 95% of the residents?
 - d. Two hundred residents have incomes of at least \$4,440 per month. What is the population of Daisy City?

Answers:

- a. 93.32%
- b. 2.12%
- c. Min = 2020 Max = 3980
- d. 100,000

20. Z is a standard normal random variable. Compute the following probabilities.
- a. $P(-1.33 \leq Z \leq 1.67)$
 - b. $P(1.23 \leq Z \leq 1.55)$
 - c. $P(Z \geq 2.32)$
 - d. $P(Z \geq -2.08)$
 - e. $P(Z \leq -1.08)$

Answers:

- a. 0.8607
- b. 0.0487
- c. 0.0102
- d. 0.9812
- e. 0.1401

21. The length of time it takes students to complete a statistics examination is uniformly distributed and varies between 40 and 60 minutes.
- Find the mathematical expression for the probability density function.
 - Compute the probability that a student will take between 45 and 50 minutes to complete the examination.
 - Compute the probability that a student will take no more than 40 minutes to complete the examination.
 - What is the expected amount of time it takes a student to complete the examination?
 - What is the variance for the amount of time it takes a student to complete the examination?

Answers:

- $f(x) = 0.05$ for $40 \leq x \leq 60$; zero elsewhere
- 0.25
- 0.00
- 50 minutes
- 33.33

22. The advertised weight on a can of soup is 10 ounces. The actual weight in the cans follows a uniform distribution and varies between 9.3 and 10.3 ounces.
- Give the mathematical expression for the probability density function.
 - What is the probability that a can of soup will have between 9.4 and 10.3 ounces?
 - What is the mean weight of a can of soup?
 - What is the standard deviation of the weight?

ANSWERS:

- $f(x) = 1.000$ for $9.3 \leq x \leq 10.3$; zero elsewhere
- 0.90
- 9.8
- 0.289

23. Z is a standard normal random variable. Compute the following probabilities.
- $P(-1.23 \leq Z \leq 2.58)$
 - $P(1.83 \leq Z \leq 1.96)$
 - $P(Z \geq 1.32)$
 - $P(Z \leq 2.52)$
 - $P(Z \geq -1.63)$
 - $P(Z \leq -1.38)$

- g. $P(-2.37 \leq Z \leq -1.54)$
- h. $P(Z = 2.56)$

Answers:

- a. 0.8858
- b. 0.0086
- c. 0.0934
- d. 0.9941
- e. 0.9484
- f. 0.0838
- g. 0.0529
- h. 0.0000

24. The miles-per-gallon obtained by the 1995 model Z cars is normally distributed with a mean of 22 miles-per-gallon and a standard deviation of 5 miles-per-gallon.
- a. What is the probability that a car will get between 13.35 and 35.1 miles-per-gallon?
 - b. What is the probability that a car will get more than 29.6 miles-per-gallon?
 - c. What is the probability that a car will get less than 21 miles-per-gallon?
 - d. What is the probability that a car will get exactly 22 miles-per-gallon?

Answers:

- a. 0.9538
- b. 0.0643
- c. 0.4207
- d. 0.0000

25. The salaries at a corporation are normally distributed with an average salary of \$19,000 and a standard deviation of \$4,000.
- a. What is the probability that an employee will have a salary between \$12,520 and \$13,480?
 - b. What is the probability that an employee will have a salary more than \$11,880?
 - c. What is the probability that an employee will have a salary less than \$28,440?

Answers:

- a. 0.0312
- b. 0.9625
- c. 0.9909

26. Z is a standard normal variable. Find the value of Z in the following.
- a. The area between 0 and Z is 0.4678.
 - b. The area to the right of Z is 0.1112.
 - c. The area to the left of Z is 0.8554
 - d. The area between -Z and Z is 0.754.
 - e. The area to the left of -Z is 0.0681.

f. The area to the right of $-Z$ is 0.9803.

Answers:

- a. 1.85
- b. 1.22
- c. 1.06
- d. 1.16
- e. 1.49
- f. 2.06

27. The monthly earnings of computer systems analysts are normally distributed with a mean of \$4,300. If only 1.07 percent of the systems analysts have a monthly income of more than \$6,140, what is the value of the standard deviation of the monthly earnings of the computer systems analysts?

Answer:

\$800

28. A major credit card company has determined that its customers charge an average of \$280 per month on their accounts with a standard deviation of \$20.
- a. What percentage of the customers charges more than \$275 per month?
 - b. What percentage of the customers charges less than \$243 per month?
 - c. What percentage of the customers charges between \$241 and \$301.60 per month?

Answers:

- a. 59.87%
- b. 3.22%
- c. 83.43%

29. The ticket sales for events held at the new civic center are believed to be normally distributed with a mean of 12,000 and a standard deviation of 1,000.
- a. What is the probability of selling more than 10,000 tickets?
 - b. What is the probability of selling between 9,500 and 11,000 tickets?
 - c. What is the probability of selling more than 13,500 tickets?

Answers:

- a. 0.9772
- b. 0.1525
- c. 0.0668

30. In a normal distribution, it is known that 27.34% of all the items are included from 100 up to the mean, and another 45.99% of all the items are included from the mean up to 145. Determine the mean and the standard deviation of the distribution.

Answer:

Mean = 113.5

Standard deviation = 18

31. The records show that 8% of the items produced by a machine do not meet the specifications. Use the normal approximation to the binomial distribution to answer the following questions. What is the probability that a sample of 100 units contains
- Five or more defective units?
 - Ten or fewer defective units?
 - Eleven or less defective units?

Answers:

- 0.9015
- 0.8212
- 0.9015

32. Approximate the following binomial probabilities by the use of normal approximation.
- $P(x \leq 12, n = 50, p = 0.3)$
 - $P(12 \leq x \leq 18, n = 50, p = 0.3)$

Answers:

- 0.2206
- 0.7198

33. An airline has determined that 20% of its international flights are not on time. Use the normal approximation to the binomial distribution to answer the following questions. What is the probability that of the next 80 international flights?
- Fifteen or less will not be on time?
 - Eighteen or more will not be on time?
 - Exactly 17 will not be on time?

Answers:

- 0.4443
- 0.3372
- 0.1071

34. The time it takes a mechanic to change the oil in a car is exponentially distributed with a mean of 5 minutes.
- What is the probability density function for the time it takes to change the oil?
 - What is the probability that it will take a mechanic less than 6 minutes to change the oil?
 - What is the probability that it will take a mechanic between 3 and 5 minutes to change the oil?
 - What is the variance of the time it takes to change the oil?

Answers:

- a. $f(x) = (1/5) e^{x/5}$ for $x \geq 0$
- b. 0.6988
- c. 0.1809
- d. 0.25

35. The time it takes a worker on an assembly line to complete a task is exponentially distributed with a mean of 8 minutes.
- a. What is the probability density function for the time it takes to complete the task?
 - b. What is the probability that it will take a worker less than 4 minutes to complete the task?
 - c. What is the probability that it will take a worker between 6 and 10 minutes to complete the task?

Answers:

- a. $f(x) = (1/8) e^{x/8}$ for $x \geq 0$
- b. 0.3935
- c. 0.1859

36. For a standard normal distribution, determine the probability of obtaining a Z value of
- a. greater than zero.
 - b. between -2.34 to -2.55
 - c. less than 1.86.
 - d. between -1.95 to 2.7.
 - e. between 1.5 to 2.75.

Answers:

- a. 0.5000
- b. 0.0042
- c. 0.9686
- d. 0.9709
- e. 0.0638

37. The weights of items produced by a company are normally distributed with a mean of 4.5 ounces and a standard deviation of 0.3 ounces.
- a. What is the probability that a randomly selected item from the production will weigh at least 4.14 ounces?
 - b. What percentage of the items weigh between 4.8 to 5.04 ounces?
 - c. Determine the minimum weight of the heaviest 5% of all items produced.
 - d. If 27,875 of the items of the entire production weigh at least 5.01 ounces, how many items have been produced?

Answers:

- a. 0.8849
 - b. 12.28%
 - c. 4.992
 - d. 625,000
38. The life expectancy of Timely brand watches is normally distributed with a mean of four years and a standard deviation of eight months.
- a. What is the probability that a randomly selected watch will be in working condition for more than five years?
 - b. The company has a three-year warranty period on their watches. What percentage of their watches will be in operating condition after the warranty period?
 - c. What is the minimum and the maximum life expectancy of the middle 95% of the watches?
 - d. Ninety-five percent of the watches will have a life expectancy of at least how many months?

Answers:

- a. 0.0668
 - b. 93.32%
 - c. Min = 32.32 months Max = 63.68 months
 - d. 34.84 months
39. The weights of the contents of cans of tomato sauce produced by a company are normally distributed with a mean of 8 ounces and a standard deviation of 0.2 ounces.
- a. What percentage of all cans produced contain more than 8.4 ounces of tomato paste?
 - b. What percentage of all cans produced contain less than 7.8 ounces?
 - c. What percentage of cans contains between 7.4 and 8.2 ounces?
 - d. Ninety-five percent of cans will contain at least how many ounces?
 - e. What percentage of cans contains between 8.2 and 8.4 ounces?

Answers:

- a. 2.28%
 - b. 15.87%
 - c. 97.58%
 - d. 7.671 oz
 - e. 13.59%
40. A professor at a local university noted that the grades of her students were normally distributed with a mean of 78 and a standard deviation of 10.
- a. The professor has informed us that 16.6 percent of her students received grades of A. What is the minimum score needed to receive a grade of A?
 - b. If 12.1 percent of her students failed the course and received F's, what was the maximum score among those who received an F?

- c. If 33 percent of the students received grades of B or better (i.e., A's and B's), what is the minimum score of those who received a B?

Answers:

- a. 87.7
- b. 66.3
- c. 82.4

41. In grading eggs into small, medium, and large, the Nancy Farms packs the eggs that weigh more than 3.6 ounces in packages marked "large" and the eggs that weigh less than 2.4 ounces into packages marked "small"; the remainder are packed in packages marked "medium." If a day's packaging contained 10.2% large and 4.18% small eggs, determine the mean and the standard deviation for the eggs' weights. Assume that the distribution of the weights is normal.

Answer:

Mean = 3.092 Standard Deviation = 0.4

42. The weekly earnings of bus drivers are normally distributed with a mean of \$395. If only 1.1 percent of the bus drivers have a weekly income of more than \$429.35, what is the value of the standard deviation of the weekly earnings of the bus drivers?

Answer:

Standard Deviation = 15

43. A local bank has determined that the daily balances of the checking accounts of its customers are normally distributed with an average of \$280 and a standard deviation of \$20.
- a. What percentage of its customers has daily balances of more than \$275?
 - b. What percentage of its customers has daily balances less than \$243?
 - c. What percentage of its customers' balances is between \$241 and \$301.60?

Answers:

- a. 59.87%
- b. 3.22%
- c. 83.43%

44. The contents of soft drink bottles are normally distributed with a mean of twelve ounces and a standard deviation of one ounce.
- a. What is the probability that a randomly selected bottle will contain more than ten ounces of soft drink?
 - b. What is the probability that a randomly selected bottle will contain between 9.5 and 11 ounces?
 - c. What percentage of the bottles will contain less than 10.5 ounces of soft drink?

Answers:

- a. 0.9772
- b. 0.1525
- c. 6.68%

45. The time between arrivals of customers at the drive-up window of a bank follows an exponential probability distribution with a mean of 10 minutes.
- a. What is the probability that the arrival time between customers will be 7 minutes or less?
 - b. What is the probability that the arrival time between customers will be between 3 and 7 minutes?

Answers:

- a. 0.5034
- b. 0.2442

46. The time required to assemble a part of a machine follows an exponential probability distribution with a mean of 14 minutes.
- a. What is the probability that the part can be assembled in 7 minutes or less?
 - b. What is the probability that the part can be assembled between 3.5 and 7 minutes?

Answers:

- a. 0.3935
- b. 0.1723

47. The time it takes to completely tune an engine of an automobile follows an exponential distribution with a mean of 40 minutes.
- a. What is the probability of tuning an engine in 30 minutes or less?
 - b. What is the probability of tuning an engine between 30 and 35 minutes?

Answers:

- a. 0.5276
- b. 0.0555

48. The life expectancy of computer terminals is normally distributed with a mean of 4 years and a standard deviation of 10 months.
- a. What is the probability that a randomly selected terminal will last more than 5 years?
 - b. What percentage of terminals will last between 5 and 6 years?
 - c. What percentage of terminals will last less than 4 years?
 - d. What percentage of terminals will last between 2.5 and 4.5 years?
 - e. If the manufacturer guarantees the terminals for 3 years (and will replace them if they malfunction), what percentage of terminals will be replaced?

Answers:

- a. 0.1151
- b. 10.69%
- c. 50%
- d. 68.98%
- e. 11.51%

49. Approximate the following binomial probabilities by the use of normal approximation. Twenty percent of students who finish high school do not go to college. What is the probability that in a sample of 80 high school students
- a. exactly 10 will not go to college?
 - b. 70 or more will go to college?

Answers:

- a. 0.0274
- b. 0.0618
- c. 0.3372

50. Approximate the following binomial probabilities by the use of normal approximation. Eight percent of customers of a bank keep a minimum balance of \$500 in their checking accounts. What is the probability that in a random sample of 100 customers
- a. exactly 6 keep the minimum balance of \$500?
 - b. exactly 11 keep the minimum balance of \$500?
 - c. 6 or fewer keep the minimum balance of \$500?
 - d. 5 or more keep the minimum balance of \$500?
 - e. 10 or fewer keep the minimum balance of \$500?
 - f. 11 or fewer keep the minimum balance of \$500?

Answers:

- a. 0.1124
- b. 0.0803
- c. 0.2912
- d. 0.9015
- e. 0.8212
- f. 0.9015

51. Approximate the following binomial probabilities by the use of normal approximation.
- a. $P(X = 18, n = 50, p = 0.3)$
 - b. $P(X \geq 15, n = 50, p = 0.3)$
 - c. $P(X \leq 12, n = 50, p = 0.3)$
 - d. $P(12 \leq X \leq 18, n = 50, p = 0.3)$

Answers:

- a. 0.0805
- b. 0.5596
- c. 0.2206
- d. 0.7198

52. Twenty percent of the employees of a large company are female. Use the normal approximation of the binomial probabilities to answer the following questions. What is the probability that in a random sample of 80 employees
- a. exactly 16 will be female?
 - b. 14 or more will be female?
 - c. 15 or fewer will be female?
 - d. 18 or more will be female
 - e. exactly 17 will be female?

Answers:

- a. 0.1114
- b. 0.7580
- c. 0.4443
- d. 0.3372
- e. 0.1071

53. The average life expectancy of dishwashers produced by a company is 6 years with a standard deviation of 8 months. Assume that the lives of dishwashers are normally distributed.
- a. What is the probability that a randomly selected dishwasher will have a life expectancy of at least 7 years?
 - b. Dishwashers that fail operating in less than $4\frac{1}{2}$ years will be replaced free of charge. What percent of dishwashers are expected to be replaced free of charge?
 - c. What are the minimum and the maximum life expectancy of the middle 95% of the dishwashers' lives? Give your answer in months.
 - d. If 155 of this year's dishwasher production fail operating in less than 4 years and 4 months, how many dishwashers were produced this year?

Answers:

- a. 0.0668
- b. 1.22%
- c. 56.32 and 87.68 (Months)
- d. 25,000