

Chapter VIII

Some Special Continuous Distribution Functions

Exercises

8. 1.

Assume that the average weekly income of 10000 workers in an enterprise is 500 € and the standard deviation is 100 €. If the distribution is normal, find the number of workers having a weekly income

- a) below 500 €,
- b) above 500 € but below 600 €
- c) above 600 €.

8. 2.

The distribution of heights of American women aged 18 to 24 is approximately normally distributed with mean 65.5 inches and standard deviation 2.4 inches.

Determine the intervals in which the heights of

1. 68%
2. 95%

of these American women lie.

8. 3.

Show graphically that the binomial distribution with $n = 10$ and $p = 0.5$ is well approximated by the normal distribution.

8. 4.

The life of a particular type of light bulb is normally distributed with a mean of 1100 hours and a standard deviation of 100 hours.

What is the probability that a light bulb of this type will last between 1000 and 1200 hours?

8. 5.

The target value for the thickness of a machined cylinder is 8 cm. The upper specification limit is 8.2 and the lower specification limit is 7.9. A machine produces cylinders that have a mean thickness of 8.1 cm and a standard deviation of 0.1 cm.

Find the probability that the thickness of a cylinder

1. lies within the specification limits.
2. deviates from the mean by 0.5 cm?
3. is at least 8 cm?

8. 6.

The mean and the standard deviation of all cash sale amounts in a small shop in the last year are 60 € and 10 €, respectively. Assume that the amounts are distributed normally.

1. What proportion of the amounts is

- a) between 55.00 € and 72.50 €?
- b) above 72.50 €
- c) below 55.00 €

2. What is the amount above which the proportion of the amounts is 20%?

8.7.

A set of exam marks has a mean of 45 and a standard deviation of 15. You should assume that the marks are integers and that they can be approximated by a normal distribution.

1. If the pass mark is 40, what percentage of candidates passes?
2. What mark should be used to ensure that 75% of the candidates pass?
3. Suppose that the pass mark is 40 and that ten candidates are selected at random. Use the probability that you found in part 1 to find the probability that at least six of them pass.

8.8.

More and more households in the United States have at least one computer. The computer is used for office work at home, research, communication, personal finances, education, entertainment, and a myriad of other things.

Suppose the average number of hours a household personal computer is used for entertainment is 2 hours per day. Assume the times for entertainment are normally distributed and the standard deviation for the times is half an hour.

1. Find the probability that a household personal computer is used for entertainment between 1.8 and 2.75 hours per day.
2. Find the probability that a household personal computer is used for entertainment at least 1.4 hours per day.
3. Find the maximum number of hours per day that the bottom quartile of households uses a personal computer for entertainment.

8.9.

An airline determines that there is a 95% chance that a passenger with a ticket will show up for a given flight. Suppose that the airline has sold tickets to 330 passengers for a flight with 320 seats.

1. Find the mean and standard deviation for the number of passengers that will show up for the flight.
2. Explain why the normal approximation to the binomial distribution can be used in the situation.
3. Use the normal distribution to the binomial distribution to compute the probability that 320 or less of the 330 people holding the ticket will show up for the flight.

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