

Statistisk Dataanalyse 2023

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Exercise Class NR3

Solutions to the Tasks

Task 1 – Description / Solution

- Find the sample space for the gender of the children if a family has three children. Use B for boy and G for girl.
- Solution: We can see, that we have 3 children and 2 genders.
- We have defined girls with Capital G and boys with Capital B.
- Now we have defined the probabilities.

Probability	3 Boys	2 Boys / 1 Girl	1 Boy / 2 Girls	3 Girls	2 Girls / 1 Boy	1 Girl / 2 Boys	2 Girls / 1 Boy	2 Boys / 1 Girl
Total	BBB	BBG	BGG	GGG	GGB	GBB	GBG	BGB

Task 2 – Description / Solution

- If a family has three children, find the probability that all the children are girls.
- Solution: The probability for all the outcome to be 3 children which are girls. Will be $\frac{1}{8}$.

Task 3 – Description / Solution

- If the probability that a person lives in an industrialized country of the world is $\frac{1}{5}$, find the probability that a person does not live in an industrialized country.
 - Solution: The probability is, that the other person does not live in a industrialized country is $\frac{4}{5}$.
 - The reason because it is $\frac{4}{5}$, is because there is $\frac{1}{5}$ chance for the person to live in a industrialized country, but then we have 5 outcomes left which ends with $\frac{4}{5}$.

Task 4 – Description

- The table below contains information on the number of daily emergency service calls received by the volunteer ambulance service of HappyTown for the last 50 days: 22 days of which 2 emergency calls were received, 9 days of which 3 emergency calls were received, 8 days of which no emergency calls were received, etc.

Task 4 - Solution

- Solution: We can see, that we have been asked to find the probability that **2 or more emergency calls are received on a day**. Note the thick marked question, and the red marked table.
- We can see, that the number of service is: $2+3+4=9$. And the total of days are 50.
- So the probability is: $9/50 = 0,18 = 18\%$

Number of Service Calls per Day (X)	Number of Days (fj)
0	8
1	10
2	22
3	9
4	1
Total	50

Task 5 - Description

- Determine which of the following distributions is a cumulative probability distribution.

i)

X	1	2	3	4	5
P(X≤x)	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{9}{20}$	$\frac{6}{8}$	$\frac{20}{20}$

ii)

X	22	33	44	55	66	77
P(X≤x)	-0.4	0.2	0.4	0.7	0.8	1

iii)

X	0	3	5	6
P(X≤x)	0.25	0.25	0.25	0.25

iv)

X	0	2	4	6
P(X≤x)	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{4}{16}$

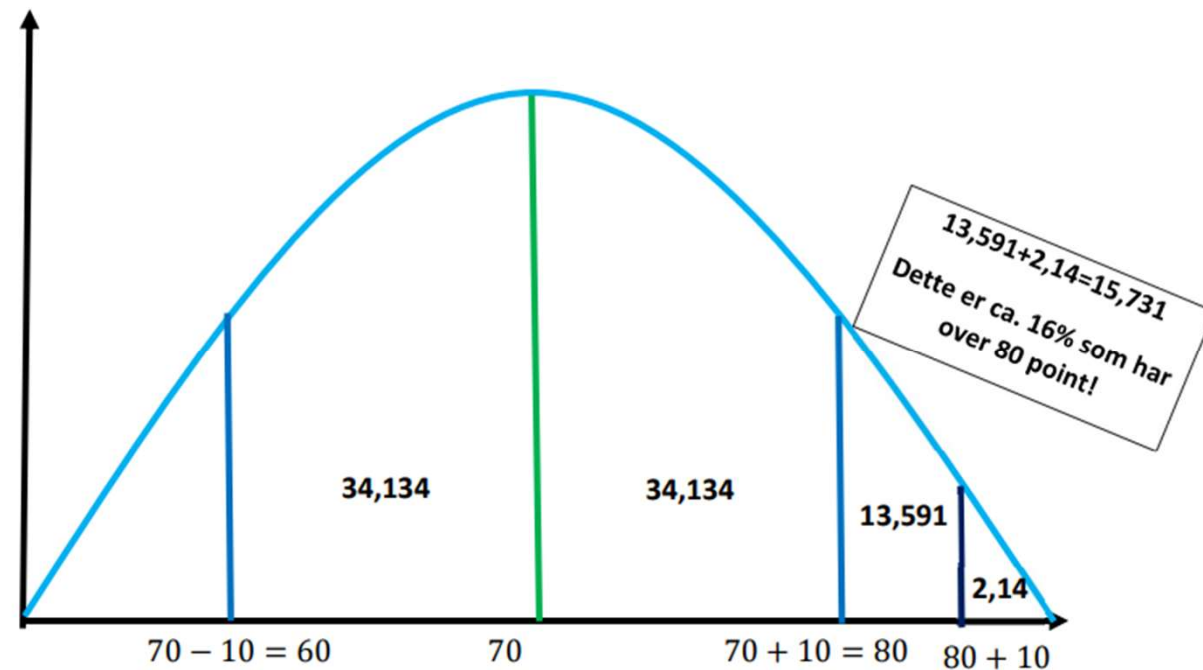
- Solution: We can see, that it will be ii). The reason is clear, and that is because when we have one probability many times, it will result that our outcome becomes more bigger and reaches near 1.

Task 6 – Description

- The grades of a group of 1000 students in an exam are normally distributed with a mean of 70 and a standard deviation of 10. Approximately, how many students have grades greater than 80?
 - A.) 680 students
 - B.) 840 students
 - C.) 160 students
 - D.) 50 students
 - E.) 320 students

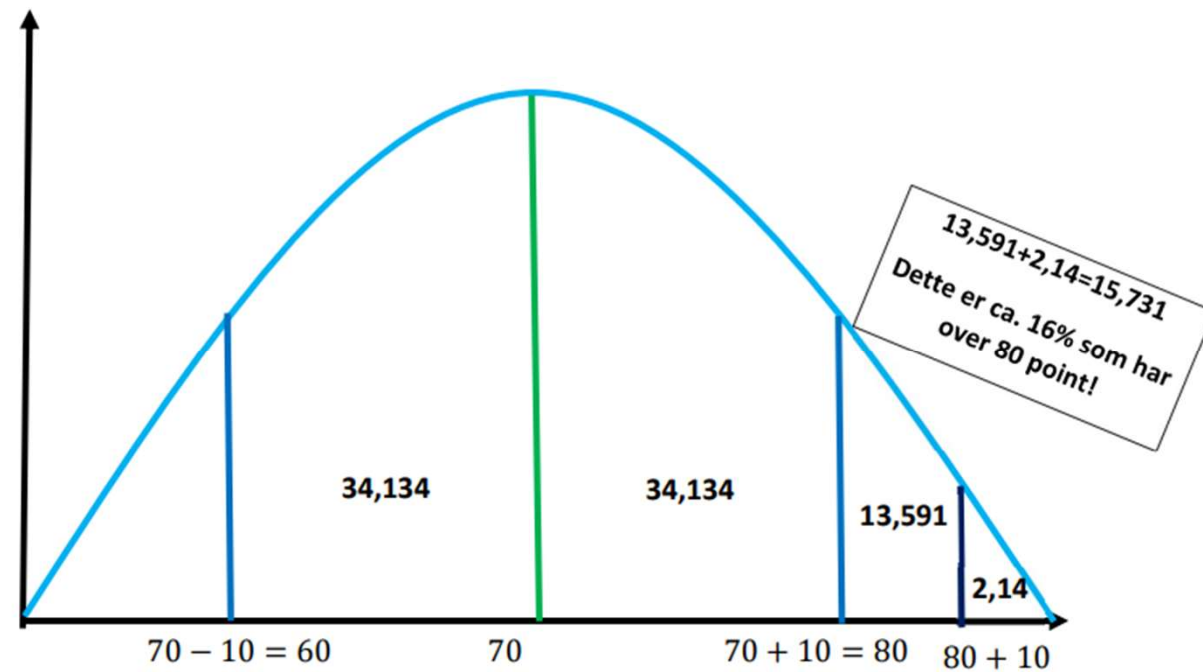
Task 6 - Solution

- To solve this question, we need to create a parabola where the middle value is the mean.
- Then we add the standard deviation with the mean. Then we increase the percentage of the students across 1000 students.
 - This means
 $(34,134 * 2) + 13,591 = 81,859$



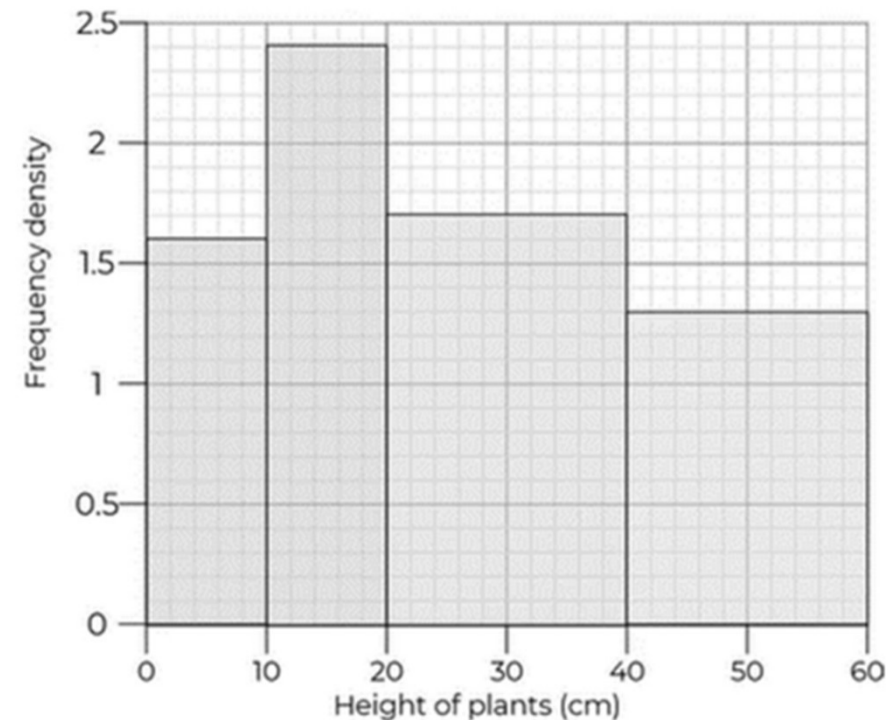
Task 6 - Solution

- When we continue from 80 along with the x-axis then we can see that the addition of $13,591 + 2,14 = 16\%$
- We can therefore see, that 16% of the students which have scored higher than 80 in grades.
- **Conclusion: 160 students have a score over 80 points!**



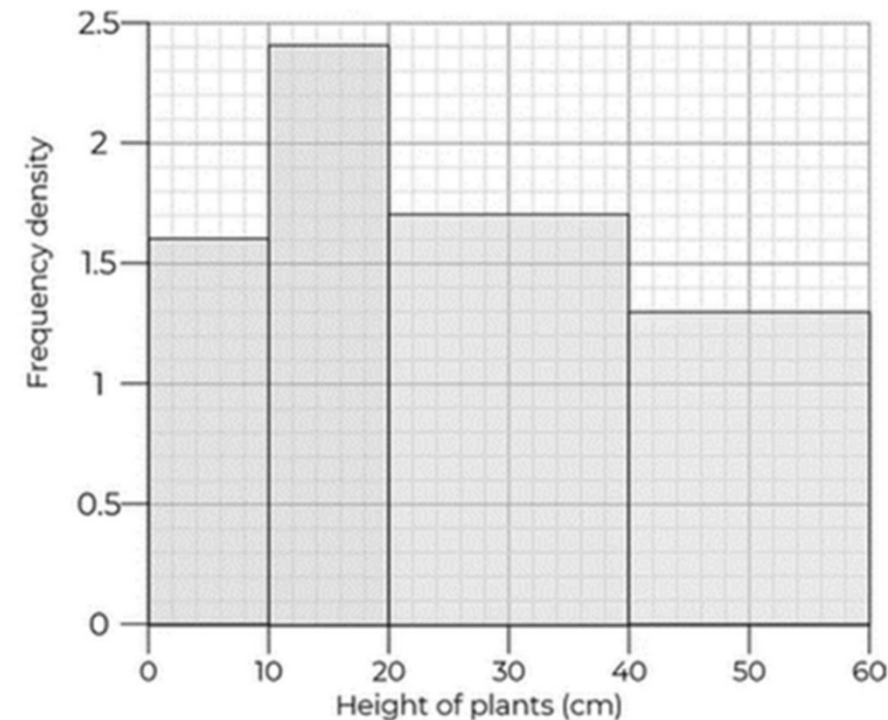
Task 7 - Description

- We visited a field with plants. We measured the height of each plant and built the histogram below. We then chose one plant at random. What is the probability that the plant is under 30 cm tall?



Task 7 – Solution

- Solution: Looking towards the x-axis we can see that we are asked to find the probability of a plant height below 30 cm.
 - This means from 0 to 20. (30 excluded)
 - Because we have 3 heights of the seven, we have the probability of: $\frac{3}{7}$.



Task 8 - Description

- M&M sweets are of varying colors and the different colors occur in different proportions. The table below gives the probability that a randomly chosen M&M has each colour, but the value for orange candies is missing.

Color	Brown	Red	Yellow	Green	Orange
Probability	0.2	0.3	0.2	0.1	?

- You draw an M&M at random from a packet. What is the probability that you get either a green one or an orange one?

Task 8 - Solution

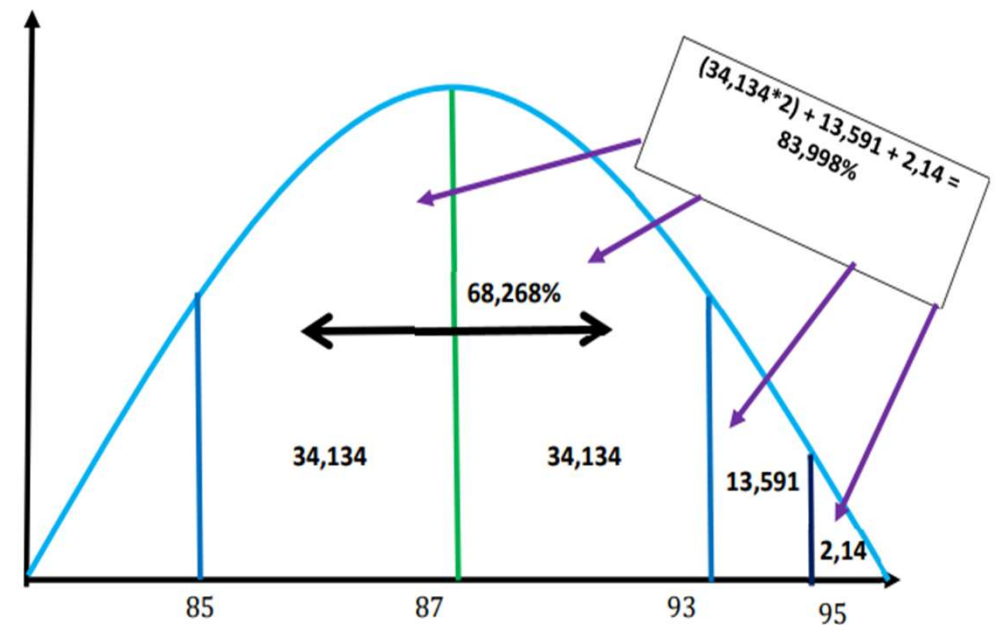
- Solution: We have been asked about the probability between one color or the other, therefore we can say the probability is $1/5$.
- The reason is clear, and that is because we have a "choice" between two variables, where we "must" only pick one!

Task 9 - Description

- What percent of cases are likely to be between 85 and 93 in a normal distribution with mean 87 and variance 4?
 - A.) 83,85%
 - B.) 30,72%
 - C.) 49,87%
 - D.) 69,02%
 - E.) None of These

Task 9 - Solution

- Solution: We will start by creating a graph with the different values. Then we distributed them into the respective percentages of normal distribution.
- Our Answer will be that our confidence level is between 85 and 93, which is 68%.



Task 10 – Description/Solution

- A survey found that one out of five Americans say he or she has visited a doctor in any given month. If 10 people are selected at random, find the probability that exactly 3 will have visited a doctor last month.
- Solution: We can see, that there are 10 persons which have been randomly selected and we can see that we have 2 genders.
- Because of that we can say, the probability is $\frac{2}{10}$.

Task 11 - Description

- Suppose a loaded die has the following model.

Face	1	2	3	4	5	6
Probability	0.3	0.1	0.1	0.1	0.1	0.3

- If this die is thrown and the top face shows an odd number:
 - A.) What is the probability that the die shows a four?
 - B.) What is the probability that the die shows a 1?

Task 11A - Solution

- Solution: We will start by counting how many numbers we have in a dice play.
- In this case, we have 3 numbers in the probability in accordance with the other 6 options. Therefore we can say that the probability is $\frac{3}{6}$ which is also the same for landing in a odd-number.

Task 11B - Solution

- Solution: We will count, how many probabilities are for a dice to land on 0,1.
- To understand the question better, we are being asked that because we have 4 probabilities with 0,1 out of the 6 where one of them is at face 4. Therefore we can say that our answer ends up being $4/6=0,66$.

Tak for i dag!

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