Episode 05 – A statistics exercise

Chapter 2 – Statistics

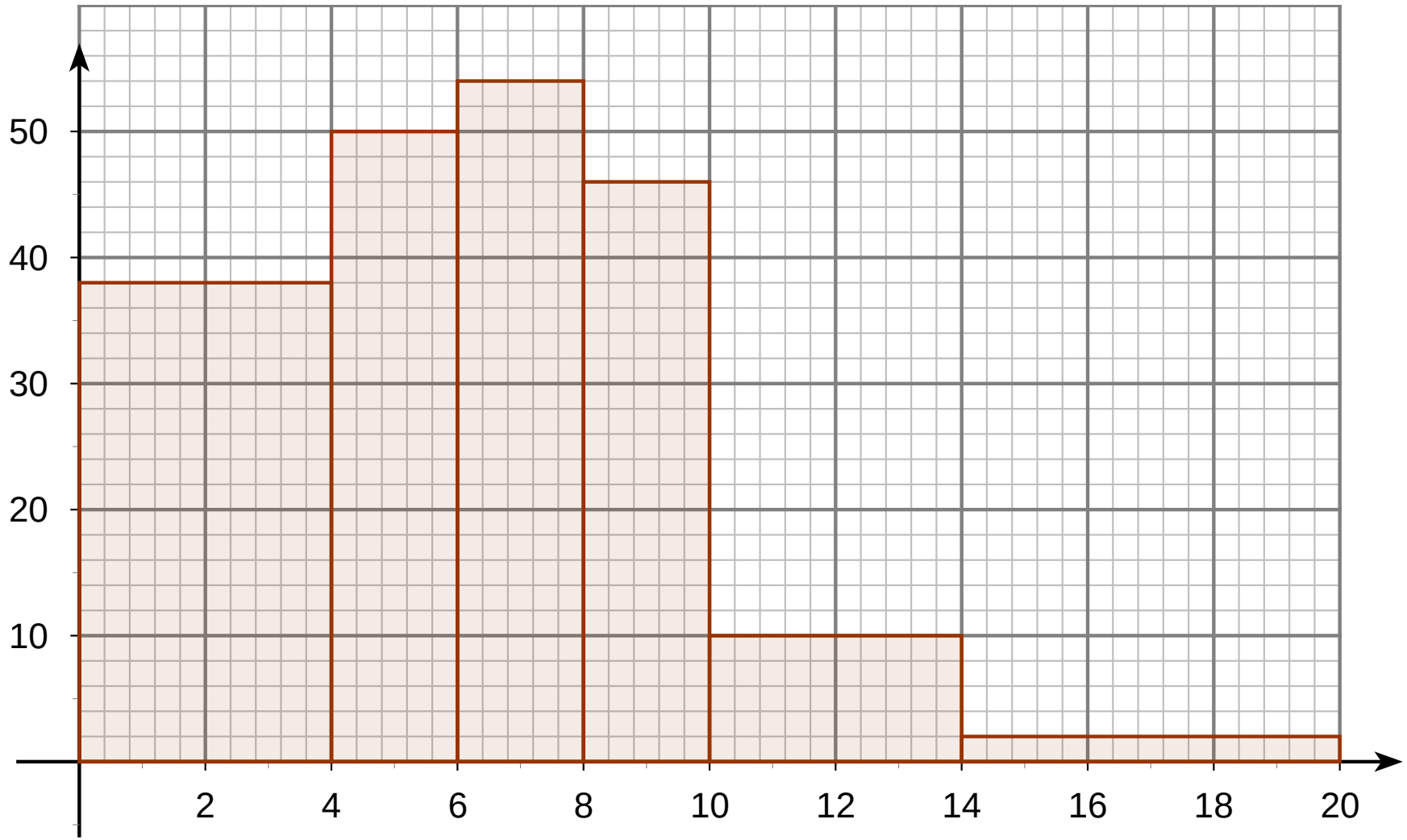
European section, season 1

In a casino game, people can win between 0 and 20 pounds. The fee to play this game is 10 pounds. A study has been carried over 200 people, each playing 1 game. Their winnings after the games are shown in the table below. The first line gives the possible winnings, gathered in intervals. The second line shows the number of people whose winnings at the end of the game was in each interval.

W.	[0; 4[	[4; 6[	[6; 8[	[8; 10[	[10; 14[	[14; 20[
A.F.	38	50	54	46	10	2

For all computations, whenever necessary, the middle of each interval will be used.

1. Histogram.



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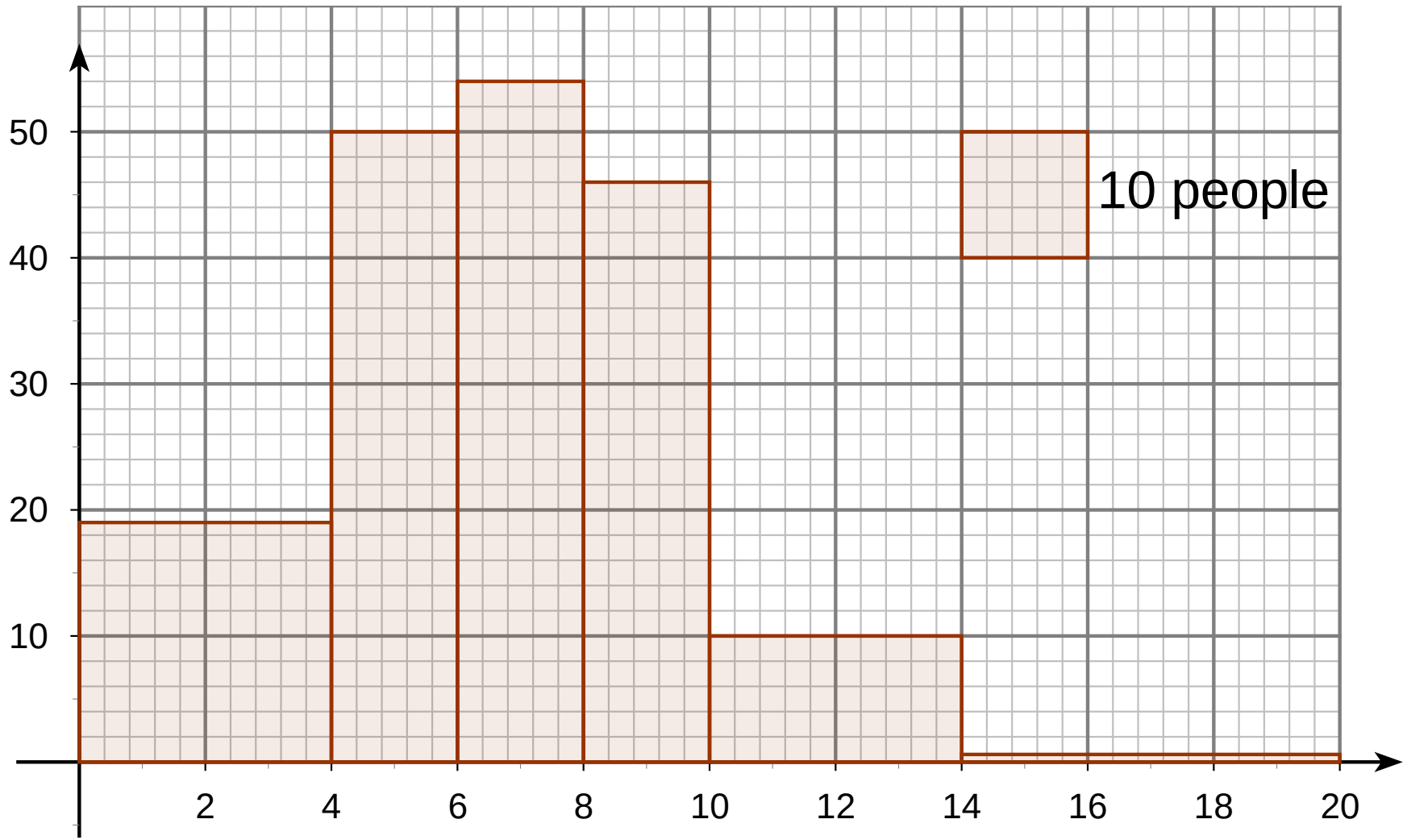

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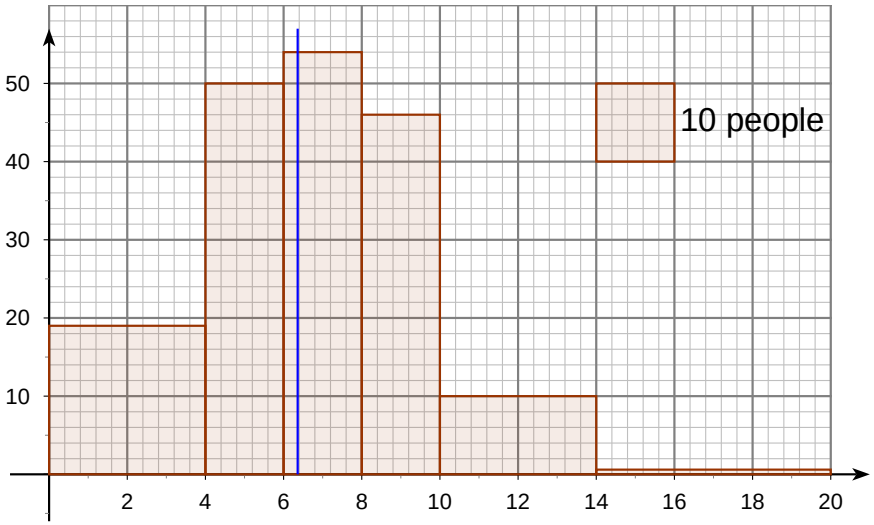

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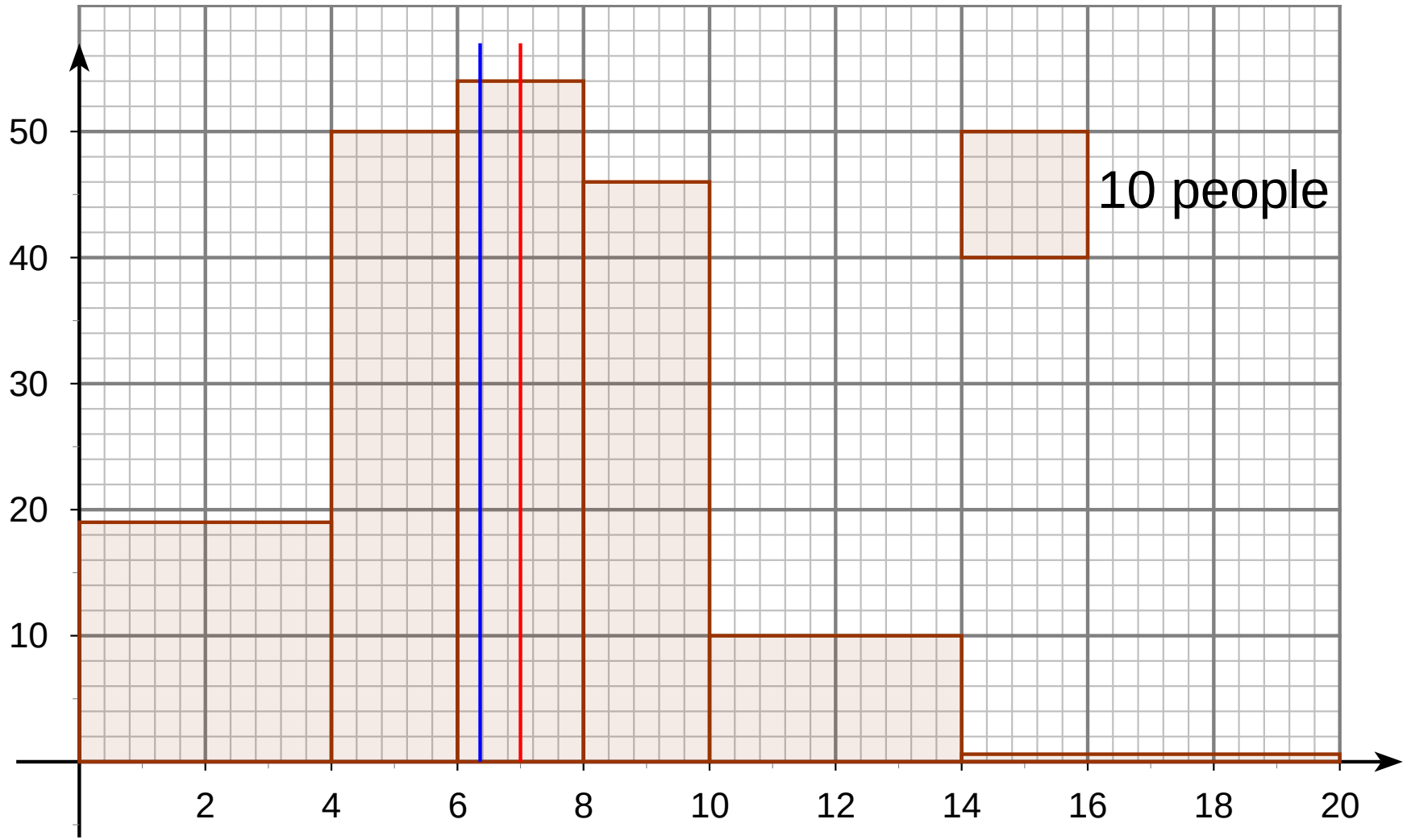
So, finally,

$$Med = [6;8[\ ;\ Q_1 = [4;6[\text{ and } Q_3 = [8;10[.$$

or

$$Med = 7\ ;\ Q_1 = 5 \text{ and } Q_3 = 9.$$


50
40
30
20
10
2
4
6
8
10
12
14
16
18
20
10 people

Another study has been carried over 500 other people. The results are shown in the table below.

Winning	0	1	2	3	4	5	6	7	8	9
Frequency	27	34	37	34	42	41	39	41	35	29
Winning	10	11	12	13	14	15	16	17	18	19
Frequency	25	23	24	17	12	9	11	8	5	7

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    - The minimum is 0.
    - The maximum is 19.
    - The range is $19 - 0 = 19$.

5. Compute the average winnings of these 500 values :

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$$\frac{0 \times 27 + 1 \times 34 + \cdots + 19 \times 7}{500} = 6.99$$

The average is 6.99.

6. Find out the median of these values and show all the steps in your method.

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   There are 500 values. It's an even number so the median is between the 250th and the 251st value. Using the C.A.F. (cumulative absolute frequencies) we see that the median is 6.

7. According to these results, would you play this game ?

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   Why not, but it's more likely to lose money than to win, as the fee is 10 pounds and the average winnings after 500 games only amounts to $6,99$ pounds.

- Use the two averages to compute the average of the 700 values. Show your computation.

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  In this computation, we have to consider the fact that there are 200 values in the first set of data and 500 in the second. So the global mean is

$$\frac{200 \times 6.36 + 500 \times 6.99}{700} = 6.81.$$

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  We can’t find the value of the median, as in one case the data is gathered in intervals, and in the second it’s just listed.We could gather the 700 values in classes, but it wouldn’t be very accurate.