

Statistics lesson 5 - Calculate the Mean / Average

Magic Monk Tutorials

1 Find the average of the following.

1.1 23, 47, 1, 2, 3, 106, 235, 6, 11

There are 9 elements.

$$\text{Average} = \frac{23 + 47 + 1 + 2 + 3 + 106 + 235 + 6 + 11}{9} = \frac{434}{9}$$

1.2 1, 1, 1, 1, 2, 3, 6, 11, 23, 47, 106, 235, 551

There are 13 elements.

$$\text{Average} = \frac{1 + 1 + 1 + 1 + 2 + 3 + 6 + 11 + 23 + 47 + 106 + 235 + 551}{13} = \frac{988}{13}$$

1.3 3, 5, 6, 8, 29, 10, 24, 75

There are 8 elements.

$$\text{Average} = \frac{3 + 5 + 6 + 8 + 29 + 10 + 24 + 75}{8} = \frac{160}{8} = 20$$

2 The average of a list is 4, and its values are 1, 5, x, 6, 2, 3, 4. Calculate the value of x.

There are 7 values in total.

$$\text{Average} = \frac{1 + 5 + x + 6 + 2 + 3 + 4}{7}$$

Substitute our value for the Average, which is 4.

$$\begin{aligned} 4 &= \frac{1 + 5 + x + 6 + 2 + 3 + 4}{7} \\ 4 \cdot 7 &= 1 + 5 + x + 6 + 2 + 3 + 4 \\ 28 &= 21 + x \\ x &= 7. \end{aligned}$$

3 Challenge question: A list has a lowest value of 6, a highest value of 20, a median value of 10 and an average of 10. Prove this list cannot contain 5 or 6 numbers.

Assume our list is of the form 6, x, 10, y, 20. This has a highest of 20, lowest of 6 and median of 10. We know our average must be 10, so

$$10 = \frac{6 + x + 10 + y + 20}{5}$$

$$50 = 6 + x + 10 + y + 20$$

$$14 = x + y$$

But this is not possible, since x must be larger than 6 and y must be larger than 10 y .

Assume our list is of the form 6, a , b , c , d , 20 where $(b+c)/2 = 10$ to satisfy the median. We know our average must be 10, so

$$10 = \frac{6 + a + b + c + d + 20}{6}$$

$$60 = 6 + a + b + c + d + 20$$

$$34 = a + b + c + d$$

But we have $b + c = 20$, so

$$14 = a + d$$

But this is not possible, for similar reasons to above. So no such lists of size 5 or 6 exists.