Answer on Question #52170 – Math – Statistics and Probability

2. In how many ways can a committee of 5 people be chosen out of 9 people?
3. If two dies are tossed together what is the probability of having sum of 5 as the outcome?
4. If two dies are tossed together, what is the probability of having equal outcomes?
5. In how many ways can the word "HOSPITAL" be arranged?
6. In how many ways can the word "TOPO" be arranged?
10. Find the standard deviation of the distribution 12,6,7,3,15,10,18,5.

Solution

2. Assume that the order of selection does not matter. We use the formula of combinations without repetition:

C(n, m) = n!/(m!*(n-m)!). Committee of 5 people out of 9 people can be chosen in

C(9;5) = 9!/(5!*(9-5)!) =(9*8*7*6*5!)/(5!*4*3*2)=9*2*7=126 ways..
3. If two dies are tossed together, there are 4 ways to have a sum of 5: (1,4),(2,3),(3,2),(4,1). Besides, there are 36 ways to roll two dies, so the unknown probability is 4/36 = 1/9.
4. If two dies are tossed together, there are 6 ways to have equal outcomes: (1,1),(2,2),(3,3),(4,4), (5,5), (6,6). Besides, there are 36 ways to roll two dies, so the probability of having equal outcomes is 6/36 = 1/6.
5. We use the formula of permutation without repetition: P = n!, as all letters are different. So, the word "HOSPITAL" can be arranged in P = 8! =8*7*6*5*4*3*2*1= 40320 ways
6. The number of different permutations of 4 objects, where there are 1 indistinguishable letter “T”, 2 indistinguishable letters “O”, 1 indistinguishable letter “P”. We use the formula of permutations with repetition of indistinguishable objects:

P(1,2,1) =(1+2+1)!/(1!*2!*1!)=4!/2!=12 ways. Because letter "o" repeats twice in the word "TOPO", we use the formula P = n!/2!. So, the word "TOPO" can be arranged in P = 4!/2! = 12 ways.
10. Mean of 12,6,7,3,15,10,18,5 is $m = \frac{12+6+7+3+15+10+18+5}{8} = \frac{76}{8} = 9.5$
The formula for the population standard deviation is

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - m)^2}{n}} = \sqrt{\frac{(12-9.5)^2+(6-9.5)^2+(7-9.5)^2+(3-9.5)^2+(15-9.5)^2+(10-9.5)^2+(18-9.5)^2+(5-9.5)^2}{8}} = \sqrt{\frac{190}{8}} =$$

$$= \sqrt{23.75} = 4.87.$$

The formula for the sample standard deviation is

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - m)^2}{n-1}} = \sqrt{\frac{(12-9.5)^2+(6-9.5)^2+(7-9.5)^2+(3-9.5)^2+(15-9.5)^2+(10-9.5)^2+(18-9.5)^2+(5-9.5)^2}{8-1}} = \sqrt{\frac{190}{7}} =$$

$$= \sqrt{27.14} = 5.21.$$

The standard deviation of the distribution 12,6,7,3,15,10,18,5 is σ = 5.21