

Question: How many solutions are there to the equation

$$x_1 + x_2 + x_3 + x_4 + x_5 + x_6 = 29$$

where x_i ; $i = 1; 2; 3; 4; 5; 6$; is a nonnegative integer such that

a) $x_i > 1$ for $i = 1, 2, 3, 4, 5, 6$?

Solution: Denote $y_i = x_i - 2$, y_i are nonnegative integers. Then for x_i such that $x_1 + x_2 + x_3 + x_4 + x_5 + x_6 = 29$, we have that $y_1 + y_2 + y_3 + y_4 + y_5 + y_6 = 29 - 6 \cdot 2 = 17$.

The number of nonnegative integer solutions of this equation is the number of ways to distribute indistinguishable 17 elements into 6 sets with respect of order of sets. This number is

$\binom{17+6-1}{6-1} = \binom{22}{5} = 26334$. So, there are 26334 solutions for x_i .

Answer: 26334.