

1. How many integer solutions are there to the equation

$$A + B + C + D = 17$$

$$A, B, C, D > 0$$

$$0 < A, B, C, D \leq 17$$

$$1 \leq A, B, C, D \leq 17$$

$$0 \leq A, B, C, D \leq 16$$

$$\begin{aligned} \binom{16}{3} &= \frac{16!}{13! \cdot 3!} = \frac{16 \cdot 15 \cdot 14}{3 \cdot 2} \\ &= 8 \cdot 5 \cdot 14 \\ &= 40 \cdot 14 \\ &= 560 \end{aligned}$$

2. Suppose there are 20 bags, each containing a \$¹5 coin and a \$^x7 coin. If we can use at most one coin from each bag, in how many different ways can we pay \$17, assuming that all coins are distinguishable (i.e. the \$5 coin from the first bag is considered to be different from that in the second bag, and so on). Formulate the problem using a generating function.

$$3420$$

$$(1 + x^5 + x^7)^{20}$$

Find coefficient of x^{17}

$$\binom{20}{2} \text{ for } x^5$$

$$18 \text{ for } x^7$$

$$\therefore \text{Ans } \binom{20}{2}_{18} = 3420 \text{ ways}$$