Answer on Question #45807 – Math – Combinatorics | Number Theory

Question.

At a particular receptionist, 9 guests are to stand at 3 identical round cocktail tables. How many ways can this be done if there must be at least 2 people at each table?

Solution.

We choose three of the nine guests. We can do this in C_9^3 ways. Now, make them sit at three tables so that each table had one guest. Since the tables are identical we can do it in $\frac{3\cdot2\cdot1}{3!} = 1$ way. Next we choose three of six guests. We can do this in C_6^3 ways. Make them again one at each of the three tables. Now the order is important so we can do it in $3\cdot2\cdot1 = 6$ ways. We can accommodate arbitrarily the remaining three guests in $3\cdot3\cdot3 = 27$ ways. We have by the rule of multiplication $C_9^3 \cdot 1 \cdot C_6^3 \cdot 6 \cdot 27 = \frac{9!}{3!6!} \cdot \frac{6!}{3!3!} \cdot 6 \cdot 27 = 272160$ ways.

Answer: 272160 ways.