

### Conditions

Employees of a firm receive annual ratings. In a certain department, 4 employees received excellent ratings, 15 received good ratings, and 1 received marginal rating. If 3 employees in the department are randomly selected to complete a form for an internal study of the firm, find the probability that all 3 were rated excellent

### Solution

Let's use the Classic Probability Definition. It claims, that the probability of some event A is a ratio of a number of all favorable outcomes for this event to a number of all possible outcomes.

The number of all favorable outcomes is the amount of all possible ways, how to choose 3 employees from 4 with excellent ratings:

$$C_4^3 = \frac{4!}{1!3!} = 4$$

The number of all possible outcomes is the amount of all possible ways, how to choose 3 employees from 4+15+1=20 employees:

$$C_{20}^3 = \frac{20!}{17!3!} = \frac{18 \cdot 19 \cdot 20}{1 \cdot 2 \cdot 3} = 3 \cdot 19 \cdot 20 = 1140$$

$$P = \frac{4}{1140} = \frac{1}{285}$$

**Answer:**  $\frac{1}{285}$