Independent Events "and".

Events that do not affect each other's probability.

$$P(E_1 \text{ and } E_2) = P(E_1 \cap E_2) = P(E_1)P(E_2)$$

Ex. A coin is tossed thrice.

Event: Probability of getting 3 tails.

$$P(E_1 \cap E_2 \cap E_3) = P(E_1)P(E_2)P(E_3) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)$$

$$= \frac{1}{8}$$

Ex. What is the probability of correctly guessing 5 multiple choice questions (3-4 choices, 2-5 choices)?

$$P(E_1 \cap E_2 \cap E_3 \cap E_4 \cap E_5) = \left(\frac{1}{4}\right)^3 \left(\frac{1}{5}\right)^2 \approx \frac{1}{1600} \approx 0.00064$$

0.064%

Ex. 35-people room.

Event: at least two share a b-day.

E': Everyone has a diff. b-day.

$$P(E) = 1 - P(E')$$

$$P(E) = 1 - 0.186$$

$$\approx 0.814$$

$$P(E') = \left(\frac{365}{365}\right)\left(\frac{364}{365}\right)\left(\frac{363}{365}\right)\cdots\left(\frac{331}{365}\right)$$

$$\approx 0.186$$