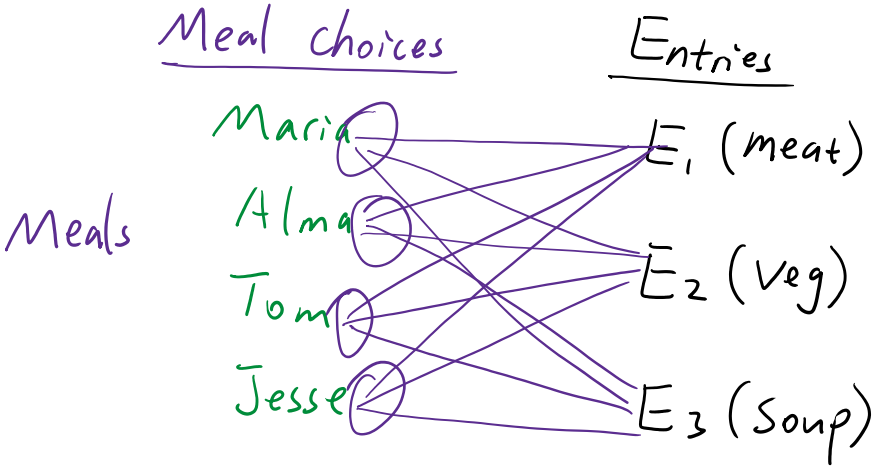
II. Multiplication

The multiplication rule would apply if events A and B are independent. A and B are independent if the probability of A occurs is the same, whether or not B will occur.

eg "Prob. tree"



$$P(\text{dinner choice}) = \frac{1}{4} \cdot \frac{1}{3}$$

$$= \boxed{\frac{1}{12}}$$

$$\boxed{P(A \text{ and } B) = P(A) \cdot P(B)}$$ where A and B are independent.

eg 20 students
transportation: {car, bus, pickup}

$$\frac{1}{20} \cdot \frac{1}{3} = \frac{1}{60}$$

eg transportation : {car, bus, pickup} $20 \cdot 3 = 60$

eg The probability of a person is being select for a job interview is 0.2. Then, the probability of acing the interview and would obtain the offer is 0.4. What is the probability of a person is successfully getting the job offer?

S:

Prob. of being select : 0.2

Prob. of getting the job : 0.4

They are independent.

$$P(\text{job offer}) = P(\text{being select}) \cdot P(\text{acing the interview})$$
$$= 0.2 \cdot 0.4$$
$$= \boxed{0.08}$$

eg A marble is drawn from an urn that consists of 2 red marbles and 1 blue marble. After the first drawn, the marble is placed back into the urn. Then the a marble is drawn again. (this is said to drawn "with replacement")
Find the probability the first marble is red and the second is blue.

S:

3 marbles ↑

$$P(\text{red and blue}) = P(\text{red}) \cdot P(\text{blue})$$
$$= \frac{2}{3} \cdot \frac{1}{3}$$
$$= \boxed{\frac{2}{9}}$$

eg Redo the above example without replacement.

S: 3 marbles

$P(\text{red and blue}) = P(\text{red}) \cdot P(\text{blue})$

$= \frac{2}{3} \cdot \frac{1}{2}$ ← 1 marble has taken out

$= \boxed{\frac{1}{3}}$

eg There are 20 green balls and 15 black balls in a jar. What is the probability that the you draw a green ball first, then draw a black one next?

S: Total : $20 + 15 = 35$, independent because they don't change color

$P(\text{green and black}) = P(\text{green}) \cdot P(\text{black})$

$= \frac{20}{35} \cdot \frac{15}{34}$ ← it doesn't say put it back so it is 1 ball less

$\approx \boxed{0.25}$

eg In your drawer you have 10 pairs of socks, 6 of which are white, and 7 tee shirts, 3 of which are white. If you randomly reach in and pull out a pair of socks and a tee shirt. What is the probability that both are white?

S:

$P(\text{white socks and white tee shirt})$

$= P(\text{white socks}) \cdot P(\text{white tee shirt})$

$= \frac{6}{} \cdot \frac{3}{}$

← "more independent" because it has two diff...

because it has two different sample space

$= \frac{6}{10} \cdot \frac{3}{7}$

$\approx \boxed{0.26}$

eg What is the probability that two people born in the same day of the week?

S: 7 days per week

$P(\text{1st day and 2nd day}) = P(\text{1st day}) \cdot P(\text{2nd day})$

$= \frac{1}{7} \cdot \frac{1}{7}$

$= \boxed{\frac{1}{49}}$

eg Compute the probability of drawing a King from a deck of cards and then drawing a Queen after.

S: know how card works ← 4 suits; nonface cards, face cards (J Q K)

$P(\text{K and Q}) = \frac{4}{52} \cdot \frac{4}{51}$ ← 1 has taken out

$\approx \boxed{0.006}$

eg There are 20 green balls and 15 black balls in a jar. What is the probability that the you draw a green ball and black one? Assuming you draw them at the same time.

S:

$$P(\text{green and black}) = P(\text{green}) \cdot P(\text{black})$$

$$= \frac{20}{35} \cdot \frac{15}{34}$$

$$\approx \boxed{0.25}$$

* Still has 1st and 2nd, because you feel it.