Ex. (From previous) Tossing a coin thrice.

$S = \{HHH, HTH, HHT, THH, THT, TTH, HTT, TTT\}$,

Event: Getting exactly 2 tails.

$P(E) = \frac{n(E)}{n(S)} = \frac{3}{8} = 0.375$

Event: Getting 3 heads.

$P(E) = \frac{1}{8} = 0.125$.

Event: Getting at least one tails. $\Leftrightarrow$ not getting 3 heads.

$1 - \frac{1}{8} = \frac{7}{8} = 0.875$.

Complement – set of outcomes that are not of the event.

Denoted by E' ← "not".

Let S be a sample space with event E. Then, ...

$$P(E') = 1 - P(E) \iff P(E) = 1 - P(E').$$

Ex. An urn contains 10 red balls and 15 blue balls. Six balls are drawn at random. What is the probability of getting at least one red ball?

E :-

$$P(E) = \frac{n(E)}{n(S)}$$

$$n(S) = {}^{25}C_6 = 177100$$

$$n(E) = n(S) - n(E')$$

$$= 177100 - 5005 = 172095$$

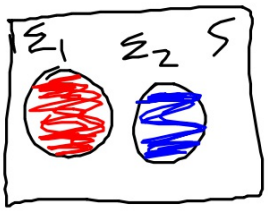
E' = six blue balls.

$$n(E') = {}^{15}C_6 = 5005$$

$$P(E) = \frac{172095}{177100} \simeq 0.972$$

Mutually Exclusive Events "or"

Events that do not share any common outcomes.



$$P(E_1 \text{ or } E_2) = P(E_1 \cup E_2) = P(E_1) + P(E_2)$$

Ex. Drawing one card from the standard 52-card deck.

E_1: Draw an ace M.E.

E_2: Draw a queen

$$P(E_1 \cup E_2) = P(E_1) + P(E_2)$$
$$= \frac{4}{52} + \frac{4}{52} = \frac{8}{52} \approx 0.154$$

Ex. (From Previous) E_1: Draw a face card (J, Q, K). M.E.

E_2: Draw an odd number.

$$P(E_1 \cup E_2) = P(E_1) + P(E_2) = \frac{12}{52} + \frac{16}{52} = \frac{28}{52} \approx 0.538$$

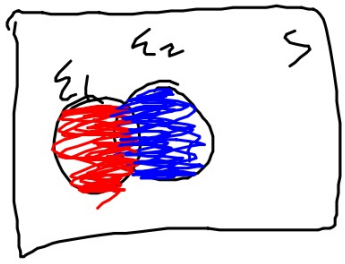
E_1: Draw a face card Not

E_2: Draw a red card. M.E.

$$P(E_1) = \frac{12}{52}$$

$$P(E_2) = \frac{16}{52}$$

Non-Mutually Exclusive Events



$$P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \text{ and } E_2)$$

("$\cap$")

E_1: Draw a face card.

E_2: Draw a red card.

$$P(E_1 \cup E_2) = \frac{12}{52} + \frac{26}{52} - \frac{6}{52} = \frac{32}{52} \approx 0.615.$$