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MATH 1342
Statistics
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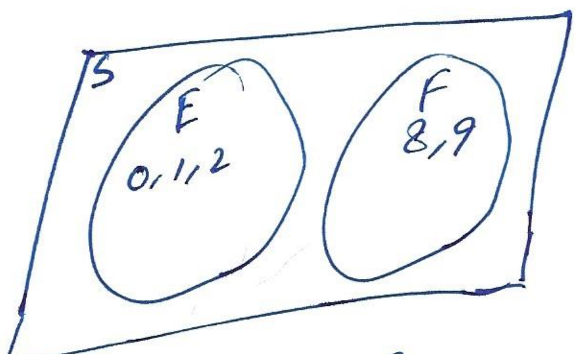
$$P(E) \approx \frac{\text{Frequencies}(E)}{\text{No. of trials}} = \frac{180}{500} = 0.36 = 36\%$$

E = "2 boys and 1 girl"

$$P(E) = \frac{N(E)}{N(S)} = \frac{3}{8} = .375 = 37.5\%$$

Two events are disjoint if they share no outcome in common.



E = "picking a marble less than or equal to 2"

F = "Picking a marble greater than or equal to 8"

$P(E) = \frac{3}{10}$

$P(F) = \frac{2}{10}$

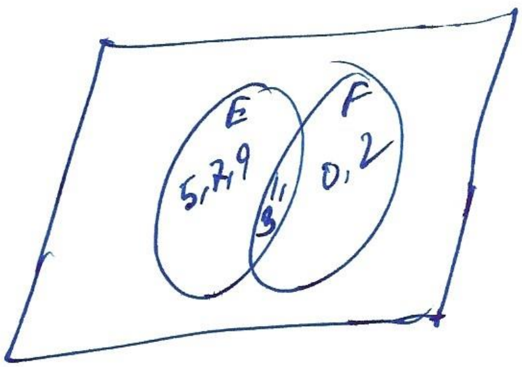
$S = \{\{0\}, \{1\}, \{2\}, \{3\}, \{4\}, \{5\}, \{6\}, \{7\}, \{8\}, \{9\}\}$

$$P(E \text{ or } F) = \frac{5}{10} = P(E) + P(F)$$

$P(E \text{ or } F) = P(E) + P(F)$ – Addition rule for disjoint events.

if $E, F, G, \ldots$ are all mutually disjoint

then $p(E \text{ or } F \text{ or } G \text{ or} \ldots) = p(E) + p(F) + p(G) + \ldots$



E = "picking an odd No."

F = " a No. less than 4"

$p(E) = \frac{5}{10}$

$p(F) = \frac{4}{10}$

$p(E) + p(F) = \frac{5}{10} + \frac{4}{10} - \frac{2}{10}$

$= \frac{7}{10}$

General Addition Rule: For any two events E and F, $p(E \text{ or } F) = p(E) + p(F) - p(E \text{ and } F)$

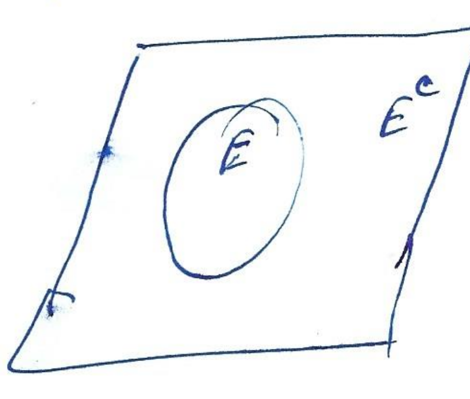
Complement of an event

Let S denote a sample space.

Let E " an event. The complement of E, E^c, is the event that contains all outcomes in S that are not in E.

$p(E \text{ or } E^c) = p(E) + p(E^c) = p(S) = 1$

$p(E^c) = 1 - p(E)$



Independent events: Two events E and F are independent if the occurrence of one event does not effect the probability chance of the other occuring.

Disjoint events are not independent.

$$S = \{\{HH\}, \{HT\}, \{TH\} \{TT\}\}$$

$$P(\text{Heads on 1st and Heads on 2nd}) = \frac{1}{4}$$

$$P(\text{Heads}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

Multiplication Rule for independent events.

if E and F are two independent events

then $P(E \text{ and } F) = P(E) \cdot P(F)$

$P(E \text{ and } F \text{ and } G \text{ and} \ldots) = P(E) \cdot P(F) \cdot P(G) \cdot \ldots$

if E, F, G ... are mutually independent.