

Section 5.2

The Addition Rule and Complements

Definition

Two events are disjoint if they have no outcomes in common. Another name for disjoint events is mutually exclusive events.

Addition Rule – P(A or B) (Disjoint Events)

- Event A occurs or event B occurs
- $P(E \text{ or } F) = P(E) + P(F)$

General Addition Rule P(A or B)

- Event A occurs or event B occurs or they both occur
- $P(E \text{ or } F) = P(E) + P(F) - P(E \text{ and } F)$

Complement of E

Notation: \bar{E} or E^c

- To calculate, find the probability of E occurring and subtract from one.
- Consists of all outcomes m which event E does not occur.
- $P(E^c) = 1 - P(E)$

1. List the Outcomes

Given $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$,
 $E = \{1, 2, 3, 4, 5\}$, $F = \{1, 3, 5, 7, 9\}$,
 $G = \{8, 10\}$

- E^c
- E or F
- E or G

2. Find the following probabilities

$P(E) = 0.20$ and $P(F) = 0.30$

- $P(E \text{ or } F)$ if $P(E \text{ and } F) = 0.10$
- $P(E \text{ and } F)$ if $P(E \text{ or } F) = 0.25$
- $P(E \text{ or } F)$ if E and F are mutually exclusive
- $P(E^c)$
- $P(F^c)$

3. Find the following probabilities

$P(E) = 0.30$, $P(E \text{ or } F) = 0.90$ and $P(E \text{ and } F) = 0.05$, Find $P(F)$

4. Find the probability

Color	Probability
Red	0.20
Blue	0.30
Green	0.10
Yellow	0.40

- Find the probability of getting red
- Find the probability of getting red or blue
- Find the probability of not getting yellow

5. Find the probability

Age	Number of Hours
20-29	35
30-39	70
40-49	20
50-59	10

- Find $P(20-29)$
- Find $P(40 \text{ or greater})$

6. Find the probability

Given a standard deck of cards and a card is pulled out at random:

- $P(\text{Diamond or King})$
- $P(\text{Ace or Queen})$
- $P(\text{Clubs or Heart})$
- $P(\text{Red Card or Queen})$

7. Find the probability

	18-20	21-23	24-26	Total
Uses Facebook	50	20	10	80
Uses Google+	5	10	20	35
Total	55	30	30	115

- If someone is chose at random, what is the probability they use Facebook?
- If someone is chose at random, what is the probability they are 24-26?
- If someone is chose at random, what is the probability they are a 21-23 Google+ user?
- If someone is chose at random, what is the probability they are 18-20 or a Facebook user?