

Example 8.

Define A and B

A { Red Card } 2nd Event

B { 10 or face card } 1st Event

A|B { Red card given 10 or face card }

Get Sample Spaces

Total Sample Space : 52 cards = 52

Sample Space of A : 26 cards = 26

Sample Space of B : 16 cards = 16

Sample Space of A|B : 8 cards = 8

Validate Independent Events

$$P(A|B) = \frac{8}{16}$$

ss

$$0.50$$

$$P(A) = \frac{26}{52}$$

ss

$$0.50$$

$$P(A|B) = P(A)$$

Example 9

Define E and F

E { Face value on die is even }

F { Face value on die is odd }

$E|F$ { Face value on die is even given face value on die is odd }

Get Sample Spaces

Total Sample Space $\{1, 2, 3, 4, 5, 6\} = 6$

Sample Space of E $\{2, 4, 6\} = 3$

Sample Space of F $\{1, 3, 5\} = 3$

Sample Space of $E|F$ $\{ \} = 0$

↑
This is the
same as $E \cap F$
which result in
an empty set $\{ \}$

Validate Independent Events

$$P(E|F) = P(E)$$

$$P(E|F)$$

"

$$\frac{0}{3} = 0$$

$$P(E)$$

"

$$\frac{3}{6} \approx 0.50$$

$$P(E|F) \neq P(E)$$

E and F are dependent events

Example 10

	Male	Female	
Young	40	50	90
Old	60	50	110
	100	100	200

Define A and B

$A \{ \text{Male} \}$

$B \{ \text{Young} \}$

$A|B \{ \text{Male given Young} \}$

Get Sample Spaces

Total Sample Space : 200 people = 200

Sample Space A : 100 people = 100

Sample Space B : 90 people = 90

Sample Space A|B : 40 people = 40

Validate Independent Events

$$P(A|B) = P(A)$$

$$P(A|B) = \frac{40}{90} = \frac{4}{9} \approx 0.444$$

$$P(A) = \frac{100}{200} = \frac{1}{2} \approx 0.50$$

$$P(A|B) \neq P(A)$$

Events A and B are
dependent