

Example 11

Define A and B

A { Head Side of 1st Coin }

B { Head Side of 2nd Coin }

B|A { Head Side of 2nd Coin given Head Side of 1st Coin }

Sample Spaces

Total Sample Space { HH, HT, TH, TT } = 4

Sample Space A { HH, HT, TH } = 3

Sample Space B { HH, HT, TH } = 3

Sample Space B|A { HH, HT, TH } = 3

Validate Independent Events

$$P(B|A) = \frac{3}{3} = 1$$

$$P(B) = \frac{3}{4} \approx 0.75$$

$$P(A) = \frac{3}{4} \approx 0.75$$

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

Events A and B are Dependent

Multiplication Rule For Dependent Events

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

$$\begin{matrix} \text{"} \\ (1)(0.75) \\ \text{ss} \end{matrix}$$

$$P(A \cap B) = 0.75$$

Book Show This As Independent ?

Example 12Define A and B

A { Male } 2nd event

B { Young } 1st event

B | A { Young male }

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

Get Sample Spaces

Total Sample Space { 200 } = 200

Sample Space A { 100 } = 100

Sample Space B { 90 } = 90

Sample Space B | A { 40 } = 40

Validate Independent Events

$$P(B|A) = \frac{40}{90}$$

$$\frac{4}{9}$$

$$\boxed{0.44}$$

$$P(B) = \frac{90}{200}$$

$$\boxed{0.45}$$

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

Events A and B are Dependent

Apply Multiplication Rule for Dependent Events

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

$$\left(\frac{40}{90} \right) \left(\frac{90}{200} \right)$$

$$0.2 \text{ or } 0.20$$

$$P(A \cap B) \approx 0.20$$

Example 13Define A and B

A { Heart }

B { 10 or Face Card }

$B|A$ { 10 or Face Card given Heart }

Get Sample Spaces

Total Sample Space : 52 cards = 52

Sample Space A : 13 cards = 13

Sample Space B : 16 cards = 16

Sample Space $B|A$: 4 cards = 4

Validate Independent Events

$$P(B|A) = \frac{4}{13}$$

SS

0.31

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

SS

0.31

$$P(A) = \frac{13}{52}$$

SS

0.25

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

A and B are Independent Events

Apply Multiplication Rule for Independent Events

$$P(A \cap B) = P(A) P(B)$$

"

$$(0.25)(0.31)$$

SS

0.0775

SS

$$P(A \cap B) = 0.08$$