

MAHAMED HUSEIN ALI

1. Independent event

GGG, GBG, BGG, GBB, BGB, BBB, GGB, BBG

$$P(GGG) = \frac{1}{8}$$

2. Independent event

$$\text{Probability} = \frac{8}{20} \cdot \frac{7}{19} = 0.1474$$

3. Non-overlapping event

$$\text{Probability} = \frac{2}{52} + \frac{2}{52} = \frac{4}{52} = \frac{1}{13}$$

4. Overlapping event

$$P(\text{Jack or Spade}) = \frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$$

5. Probability of not rolling a 2 three times = $\left(\frac{5}{6}\right)^3$

$$= \frac{125}{216}$$

$$216$$

at least once

$$P(\text{Rolling a 2 three times}) = 1 - \frac{125}{216}$$

$$216$$

$$= \frac{91}{216}$$

6. a)

	Positive	Negative	Total
Subject has the disease	111	4	115
Subject does not have the disease	11	172	183
Total	122	176	298

$$b) P(D | \text{Negative}) = \frac{4}{176} = \frac{1}{44}$$

$$c) P(\bar{D} | \text{Positive}) = \frac{11}{122}$$

$$7. P(\text{Positive} | D) = 0.98$$

$$P(\text{Positive} | \bar{D}) = 0.04$$

$$P(D) = 0.1, P(\bar{D}) = 1 - 0.1 = 0.9$$

$$P(D | \text{Positive}) = \frac{P(\text{Positive} | D) \cdot P(D)}{P(D) P(\text{Positive} | D) + P(\bar{D}) P(\text{Positive} | \bar{D})}$$

$$= \frac{0.98(0.1)}{0.1(0.98) + 0.9(0.04)}$$

$$= 0.73134$$