STAT 341 - Elizabeth Thompson

Homework 1 Solutions

2.2.22, 2.4.11, 2.4.28, 2.5.25, 3.2.5, 3.2.19

(2.2.22)

(a) $\{E1, E2\}$

(b) $\{S1, S2, T1, T2\}$

(c) $\{A, I\}$

(2.4.11)

(a) $P(A^C \cap B^C) = 1 - P(A \cup B)$
$= 1 - [P(A) + P(B) - P(A \cap B)]$
$= 1 - [0.65 + 0.55 - 0.25] = 0.05$

(b) $P[(A^C \cap B) \cup P(A \cap B^C)] = P(A \cup B) - 2P(A \cap B)$
$= 0.65 + 0.55 - 2 \times 0.25 = 0.70$

(c) $P(A \cup B) = 0.95$

(d) $P[(A \cap B)^C] = 1 - P(A \cup B) = 1 - 0.25 = 0.75$

(e) $P[(A^C \cap B) \cup P(A \cap B^C)|A \cup B]$
$= \frac{P[(A^C \cap B) \cup P(A \cap B^C)]}{P(A \cup B)} = 0.70/0.95 = 70/95$

(f) $P(A \cap B|A \cup B) = P(A \cap B)/P(A \cup B) = 0.25/0.95 = 25/95$

(g) $P(B|A^C) = P(A^C \cap B)/P(A^C) = [P(B) - P(A \cap B)]/[1 - P(A)]$
$= [0.55 - 0.25]/[1 - 0.65] = 30/35$

(2.4.28)

Let B be the event that a donation is received; let A_1, A_2 and A_3 denote the events that the call is placed to Belle Meade, Oak Hill, and Antioch, respectively. Then,

$$P(B) = \sum_{i=1}^{3} P(B|A_i)P(A_i) = 0.60 \times \frac{1000}{4000} + 0.55 \times \frac{1000}{4000} + 0.35 \times \frac{2000}{4000} = 0.46$$

(2.5.25)

P(at least one double six in n throws) = 1 - P(no double sixes in n throws) $= 1 - \left(\frac{35}{36}\right)^n$

By trial and error, $n = 25$.

(3.2.5)

P(At least 7 work) = P(3 or fewer are out)

$$= \sum_{k=0}^{3} {}_{10}C_k (0.05)^k (0.95)^{10-k} = 0.599 + 0.315 + 0.075 + 0.010 = 0.999$$

(3.2.19)

P(At least twice as many black bears as tan in 6 sightings)

= P(0 tan, 6 black) + P(1 tan, 5 black) + P(2 tan, 4 black)

$$\frac{{}_3C_0 \times_6 C_6}{{}_9C_6} + \frac{{}_3C_1 \times_6 C_5}{{}_9C_6} + \frac{{}_3C_2 \times_6 C_4}{{}_9C_6} = \frac{64}{84}$$