

Q1

Define Events

L: Event that student leaves class late

B: misses bus

Given

$$P(L) = 30\%$$

$$P(B|L) = 45\%$$

Ans:

$$P(L \cap B) = P(B|L) \times P(L) = \underline{0.135}$$

Q2

(a) Assuming independence of tickets, by complimentary events: $1 - 0.324 = 0.676$

(b) Either (1) Independent trials + Product Rule

(2) Binomial Trials


$$\text{Ans} = (1 - 0.324)^6 \approx 0.09543$$

Q2

(c) By independence of weeks:

$$\text{Ans} = \underline{0.324}$$

(d) Either: (1) Sum Rule + Product Rule
(2) Binomial $(3, \boxed{0.324})$

Let $w = P(\text{winning in a certain week})$ 

$$\begin{aligned} \text{Ans} &= ww(1-w) + w(1-w)w + (1-w)ww \\ &= \binom{3}{2} w^2(1-w) \approx \underline{0.2129} \end{aligned}$$

Q3

(a)

F: Event 1st flight is on time

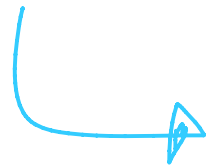
L: Event luggage makes it on flight
(connecting)

Q: Is F independent of L?

A: $P(L|F) = 0.95$,

$$P(L|\bar{F}) = 0.65$$

$$P(F) = 0.15$$



$$P(L) = P(L|F)P(F) + P(L|\bar{F})P(\bar{F})$$

(Law of Total Probability)

$$= (.95)(.15) + (.65)(1 - .15)$$
$$= 0.695$$

$\therefore P(L) \neq P(L|F)$, L & F are dependent

Q3(b) $P(L) = 0.695$

Q4] The sample space for tossing a pair of dice

$$\Omega = \{ (1,1), (1,2), (1,3), (1,4), \dots \\ \dots (6,3), (6,4), (6,5), \\ (6,6) \}$$

contains 36 elements

$$\text{let } L = \{ \text{sum is } 7 \} \\ = \{ (1,6), (2,5), (3,4), (4,3), \\ (5,2), (6,1) \}$$

$$M = \{ \text{The first die is } 2 \}$$

$$P(M|L) = \frac{1}{6} = 0.1667$$

Theoretical probability

Simulation is given in R codes.