Cambridge International AS & A Level

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Mathematics 9709/52

Paper 5 Probability & Statistics 1 October/November 2022

Question No (1)

1 On any day, Kino travels to school by bus, by car or on foot with probabilities 0.2, 0.1 and 0.7 respectively. The probability that he is late when he travels by bus is x. The probability that he is late when he travels by car is $2x$ and the probability that he is late when he travels on foot is 0.25.

The probability that, on a randomly chosen day, Kino is late is 0.235.

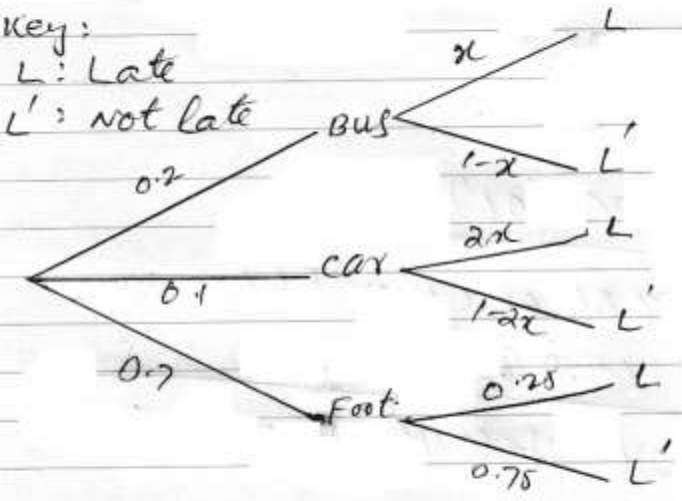
(a) Find the value of x.

(b) Find the probability that, on a randomly chosen day, Kino travels to school by car given that he is not late.

Solution:

(a)

Key:
L: Late
L': not late



P(Kino is late) = 0.325 (given)

P(BL or CL or FL) = 0.235

$(0.2)(x) + (0.1)(2x) + (0.7)(0.25) = 0.235$

$0.4x + 0.175 = 0.235$

$x = \frac{0.235 - 0.175}{0.4}$

$x = 0.15$

(b) $P(\text{Kino travels to school by car/he is not late})$

$$= \frac{P(C \cap L')}{P(L')}$$

$$= \frac{P(C \cap L')}{P(BL' \text{ or } CL' \text{ or } FL')}$$

$$= \frac{(0.1)(1-2x)}{(0.2)(1-x)+(0.1)(1-2x)+(0.7)(0.75)}$$

$$= \frac{(0.1)(1-2(0.15))}{(0.2)(1-0.15)+(0.1)(1-2(0.15))+(0.7)(0.75)} \quad \text{from (a) } x = 0.15$$

$$= \frac{0.07}{0.765}$$

$$= 0.0915$$