

## Stats 1 - ② Probability

① a) i)  $\frac{5}{25}$

ii)  $\frac{10}{25}$

iii)  $\frac{2}{25}$

b) For independent events,  $P(A) \times P(B) = P(A \cap B)$

$$\frac{5}{25} \times \frac{10}{25} = \frac{2}{25}$$

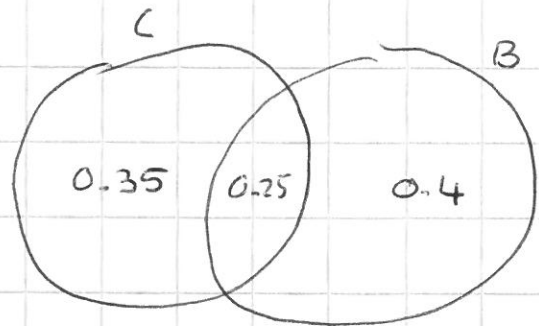
$\therefore$  The events are independent

$$c) P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{2}{20}$$

② a) i)  $P(C') = 1 - 0.6 = 0.4$

ii)  $P(C \cap B') = 0.35$

iii)  $P(B) = 0.4 + 0.25 = 0.65$



b) i)  $\boxed{\text{CAR}}$   $0.35 \times 0.9 = 0.315$

$\boxed{\text{CAR} \cap \text{BUS}}$   $0.25 \times 0.7 = 0.175$

$\boxed{\text{BUS}}$   $0.4 \times 0.3 = 0.12$

$\therefore$  Total =  $0.315 + 0.175 + 0.12 = 0.61$

ii)  $P(\text{Never}) = 1 - 0.61 = 0.39$

5 days in a row =  $0.39^5 = 0.00902$

③ a) i)  $P(F \cap C) = 0.3$

ii)  $P(G \cup S) = 0.3 + 0.15 = 0.45$

iii)  $P(C|F) = \frac{0.3}{0.55} = \frac{6}{11}$  or  $0.5454\dots$

iv)  $P(R|D) = \frac{0.25}{0.3} = \frac{5}{6}$  or  $0.833\dots$

v)  $P(F|C') = \frac{0.25}{(1-0.4)} = \frac{5}{12}$  or  $0.4166\dots$

b)  $P(F \cap C) = 0.3$  . So 2 days =  $0.3^2$

$P(F \cap G) = 0.25$  . So 2 days =  $0.25^2$

$\therefore$  Total prob =  $0.3^2 + 0.25^2 = 0.1525$

④ a)

	DISEASE	NO DISEASE	
MALE	55	50	105
FEMALE	65	80	145
	120	130	250

i)  $P(F) = \frac{145}{250}$

ii)  $P(F \cap S) = \frac{80}{250}$

iii)  $P(S) = \frac{120}{250}$

iv)  $P(F|S) = \frac{80}{120}$

b) i)  $P(\text{don't have disease}) = 1 - 0.2 = 0.8$

$\therefore$  ~~more~~  $P(4 \text{ people don't have it}) = 0.8^4$

$\therefore P(\text{at least 1 has it}) = 1 - 0.8^4 = 0.5904\dots$

ii)  $P(A|B) = \frac{P(A \cap B)}{P(B)}$

A = Not disease

B = Gives positive response

$$P(\text{positive response}) = P(A) = 0.2 \times 0.9 + 0.8 \times 0.15 \\ = 0.3$$

$$P(\text{Not disease \& Positive}) = P(A \cap B) = 0.8 \times 0.15 = 0.12$$

$$\therefore P(A|B) = \frac{0.12}{0.3} = 0.4$$