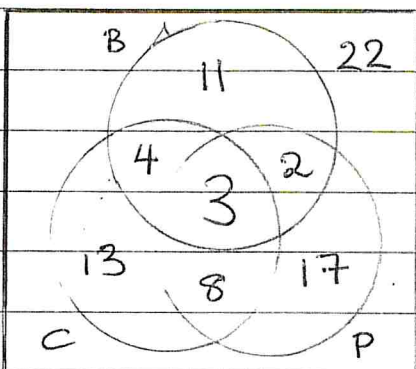


ANSWERS

Homework 8 - Probability + Tree Diagrams

Section 1

1a)



b) $\frac{13}{80}$

c) $\frac{47}{80}$

2a)

$Q_2 = \frac{100+1}{2} \text{th} = 50.5 \text{th}$

0: 23
1: 23+19=42
2: 23+19+15=57 \Rightarrow Median = 2

x	0	1	2	3	4	5	7.5	12	17	25
f	23	19	15	12	9	6	6	5	3	2

From calc mean = 3.57

b) $Q_1 = \frac{100}{4} = 25 \Rightarrow 25.5 \text{th} = 1$

$Q_3 = \frac{3 \times 100}{4} = 75 \Rightarrow 75.5 \text{th} = 4$

$IQR = Q_3 - Q_1 = 4 - 1 = 3$

s.d = 4.88 (3sf) from calc

c) Data is skewed \Rightarrow median and IQR are most appropriate

Section 2 (20 marks)

1a) B and W (or T and W) as they do not intersect.

b) $P(B \cap T) = \frac{5}{25}$ $P(B) \times P(T) = \frac{9}{25} \times \frac{8}{25} = \frac{72}{625}$

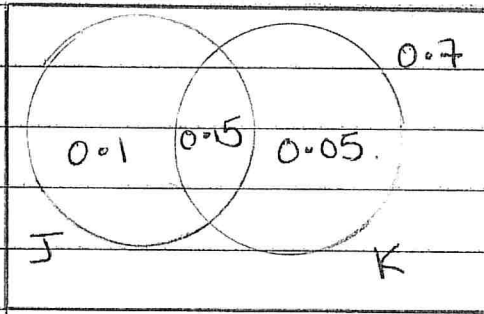
$P(B \cap T) \neq P(B) \times P(T)$ therefore not independent.

c) $\frac{7}{25}$

d) $\frac{5}{25}$

(7)

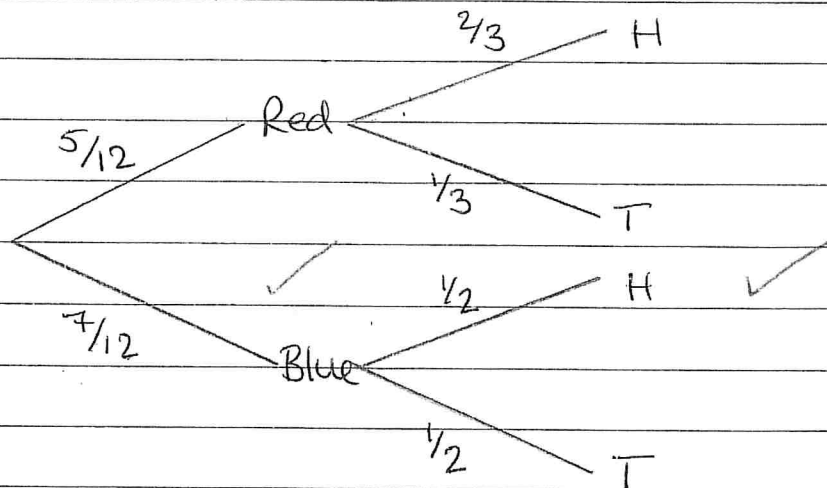
2)



- a) $1 - 0.7 = 0.3$ ✓ (6)
- b) $0.15 + 0.05 = 0.2$ ✓ (or $1 - 0.7 - 0.1$)
- c) $P(J \cap K) = 0.15$ ✓ $P(J) \times P(K) = 0.25 \times 0.2 = 0.05$
 $P(J \cap K) \neq P(J) \times P(K)$ so not independent. ✓
- d) They are not independent so are linked in some way, the teacher is correct. ✓

3.

a)

b) $P(\text{R and H or B and H})$ ✓

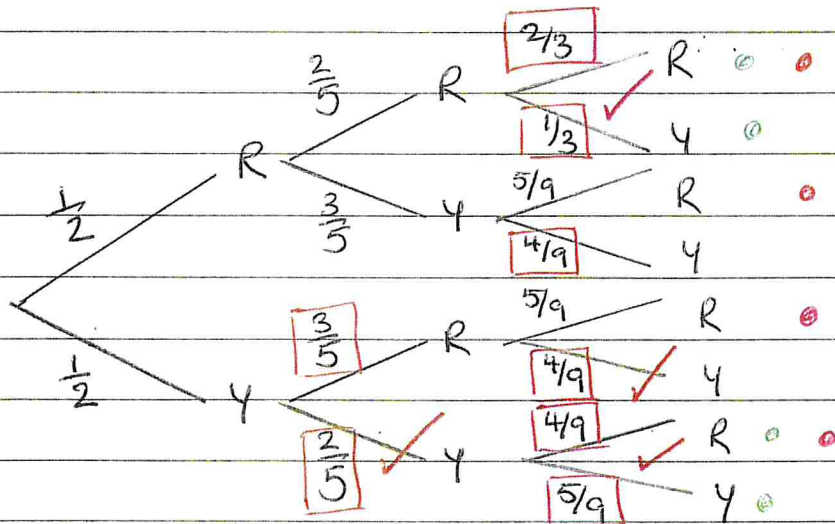
$$= \frac{5}{12} \times \frac{2}{3} + \frac{7}{12} \times \frac{1}{2} = \frac{41}{72}$$
 ✓

c) $P(\text{R and R or B and B})$ ✓

$$\frac{5}{12} \times \frac{5}{12} + \frac{7}{12} \times \frac{7}{12} = \frac{37}{72}$$
 ✓ ✓ (7)

Section 3 (14)

a)



• A = 2 tire same • B = red from Q

b) $P(A) = \frac{1}{2} \times \frac{2}{5} + \frac{1}{2} \times \frac{2}{5} = \frac{2}{5}$

c) $P(B) = \frac{1}{2} \times \frac{2}{5} \times \frac{2}{3} + \frac{1}{2} \times \frac{3}{5} \times \frac{5}{9} + \frac{1}{2} \times \frac{3}{5} \times \frac{5}{9} + \frac{1}{2} \times \frac{2}{5} \times \frac{4}{9}$
 $= \frac{5}{9}$

d) $P(A \cap B) = \frac{1}{2} \times \frac{2}{5} \times \frac{2}{3} + \frac{1}{2} \times \frac{2}{5} \times \frac{4}{9} = \frac{2}{9}$

e) $P(A \cup B) = 1 - \left(\frac{1}{2} \times \frac{3}{5} \times \frac{4}{9} + \frac{1}{2} \times \frac{3}{5} \times \frac{4}{9} \right) = \frac{11}{15}$