Solutions

(1) a) $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.16}{0.4} = 0.4$

b) $P(B|A) = \frac{P(B \cap A)}{P(A)} = \frac{0.16}{0.7} \approx 0.23$

Note: $B \cap A$ is the same set as $A \cap B$.

(2) No. Three ways to check:

i) $P(A|B) \neq P(A)$

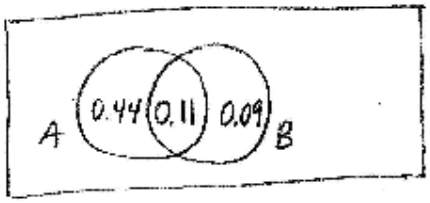
ii) $P(B|A) \neq P(B)$

iii) $P(A)P(B) \neq P(A \cap B)$

} You only need to check one of these

(3) Since A and B are independent

$P(A \cap B) = P(A)P(B) = 0.11$



$P(A \cup B) = 0.44 + 0.11 + 0.09 = 0.64$

(4) $n(S) = 2 \times 2 \times 2 = 8$

$E = \{TTT, TTH, THT, HTT\}$

$F = \{HHT, HTH, THH, TTH, THT, HTT\}$

$P(E) = \frac{4}{8} = 0.5$

$P(E|F) = \frac{n(E \cap F)}{n(F)}$ $\quad E \cap F = \{TTH, THT, HTT\}$

$= \frac{3}{6}$

$= 0.5$

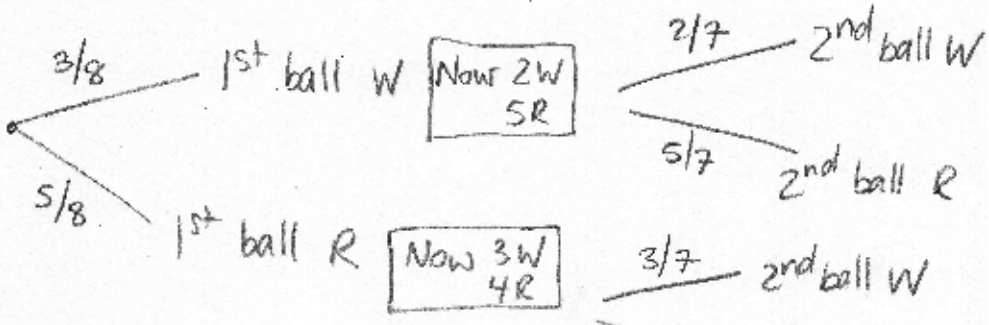
Yes, E and F are independent events, because $P(E) = P(E|F)$.

Alternatively, check that

$P(F) = P(F|E)$

or $P(E \cap F) = P(E)P(F)$.

(5)



$P(2^{nd} \text{ ball W} \mid 1^{st} \text{ ball R})$

$= 3/7$

from tree diagram

(6)

A : ace or heart

B : not a club

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

$= 15/39$

≈ 0.38

$A \cap B = \{A\heartsuit, 2\heartsuit, \ldots, K\heartsuit, A\diamondsuit, A\spadesuit\}$

$n(A \cap B) = 15$

$n(B) = 39$

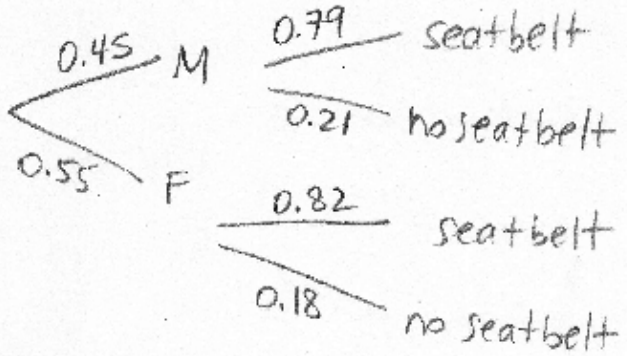
(7) $P(A) = \frac{13}{52} = 0.25$

$P(A|B) = \frac{n(A \cap B)}{n(B)} = \frac{12}{48} = 0.25$

Yes, A and B are independent because $P(A) = P(A|B)$.

Alternatively: Compare $P(B)$ and $P(B|A)$ or $P(A \cap B)$ and $P(A)P(B)$

(8)



a) $P(\text{seatbelt}) = P(M \cap \text{seatbelt}) + P(F \cap \text{seatbelt})$
$= 0.45(0.79) + 0.55(0.82)$
$= 0.8065$

b) $P(M \text{ and no seatbelt}) = 0.45(0.21)$
$= 0.0945$

c) $P(\text{no seatbelt} \mid F) = 0.18$

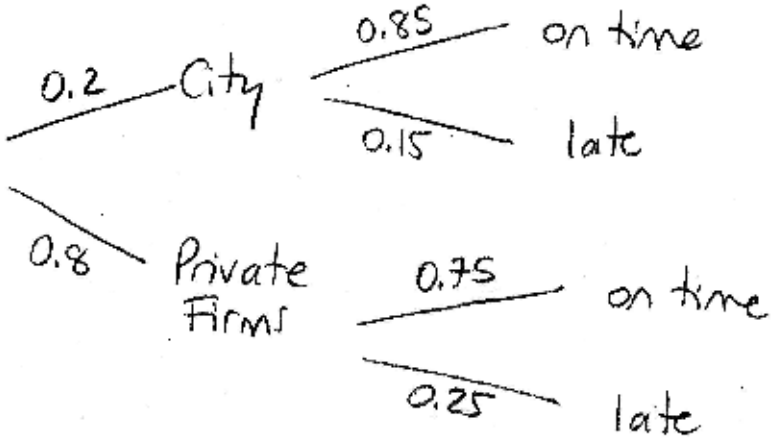
(9) a) $P(\text{Powerpoint}) = 0.26 + 0.20 = 0.46$

b) $P(\text{successful}) = 0.26 + 0.36 = 0.62$

c) $P(\text{Keynote} \mid \text{successful}) = \frac{0.36}{0.62} \approx 0.58$

d) $P(\text{unsuccessful} \mid \text{Powerpoint}) = \frac{0.20}{0.46} \approx 0.43$

(10)



a) P(City and on time)

$= 0.2(0.85)$

$= 0.17$

b) P(on time) = P(City and on time) + P(Private and on time)

$= 0.2(0.85) + 0.8(0.75)$

$= 0.77$

c) P(late | Private firm) = 0.25