

Q1.1 $P(T) = 0.20$
 $P(S) = 0.30$
 $P(T \cap S) = 0.08$

a) $= \frac{P(T \cap S)}{P(S)} = \frac{0.08}{0.3} = \underline{\underline{0.2667}}$

b) $= \frac{P(T \cap \bar{S})}{P(\bar{S})} = \frac{P(T) - P(T \cap S)}{1 - P(S)} = \frac{0.2 - 0.08}{1 - 0.3} = \frac{0.12}{0.7} = \underline{\underline{0.1714}}$

c) $= \frac{P((T \cap S) \cap (T \cup S))}{P(T \cup S)} = \frac{P(T \cap S)}{P(T \cup S)} = \frac{0.08}{(P(T) + P(S) - P(T \cap S))} = \frac{0.08}{(0.2 + 0.3) - 0.08}$
 $= \frac{0.08}{0.42} = \underline{\underline{0.1905}}$

Q1.2 $P(H) = 0.80$
 $P(S) = 0.90$
 $P(H \cup S) = 0.91$

a) $P(H \cap \bar{S}) = P(H) - P(H \cap S)$
 $= 0.8 - (P(H) + P(S) - P(H \cup S))$
 $= 0.8 - 0.8 + 0.9 - 0.91$
 $= 0.8 - 0.79$
 $= \underline{\underline{0.01}}$

b) $P(\bar{H} \cap S) = P(S) - P(H \cap S)$
 $= 0.9 - 0.79$
 $= \underline{\underline{0.11}}$

c) $P(\bar{H} \cap \bar{S}) = P(\overline{H \cup S}) = 1 - P(H \cup S)$
 $= 1 - 0.91$
 $= \underline{\underline{0.09}}$

$$Q1.3) P(T) = 0.20$$

$$P(S) = 0.30$$

$$P(T \cap S) = 0.08$$

To be independent: $P(A \cap B) = P(A)P(B)$

$$0.08 \neq 0.06$$

\therefore NOT INDEPENDANT

$$Q1.4) a) P(A) = \frac{5}{36}$$

$$P(B) = \frac{1}{6}$$

$$P(A \cap B) = \frac{1}{36}$$

$$P(A)P(B) = \frac{5}{36} \times \frac{1}{6} = \frac{5}{216}$$

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

\therefore NOT INDEPENDANT

$$b) P(A) = \frac{6}{36}$$

$$P(B) = \frac{1}{6}$$

$$P(A \cap B) = \frac{1}{36}$$

$$P(A)P(B) = \frac{6}{36} \times \frac{1}{6} = \frac{1}{36}$$

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

\therefore INDEPENDANT

Q1.5)

~~P(TX)~~ =Prob. to choose TX = ~~10~~ 60%.

Prob. to choose NT = 10%.

Prob. to choose AK = 30%.

Prob. of finding oil in TX = ~~20~~ 30%.Prob. of finding oil in AK = ~~10~~ 20%.

Prob. of finding oil in NT = 10%.

$$\begin{aligned}
 1) \text{ Prob of finding oil} &= P(\text{oil} | TX) + P(\text{oil} | NT) + P(\text{oil} | AK) \\
 &= (30\% \times 60\%) + (10\% \times 10\%) + (30\% \times 20\%) \\
 &= 0.18 + 0.01 + 0.06 \\
 &= \underline{\underline{0.25}}
 \end{aligned}$$

$$2) P(TX | \text{oil}) = \frac{P(TX \cap \text{oil})}{P(\text{oil})} = \frac{0.18}{0.25} = \underline{\underline{0.72}}$$

$$\text{Q1.6) a) } = \frac{1490}{2201} = \underline{\underline{0.6769}}$$

$$\text{b) } = \frac{325}{2201} = \underline{\underline{0.1476}}$$

$$\text{c) } = \frac{203}{711} = \underline{\underline{0.2855}}$$

$$\text{d) } P(S) = \frac{711}{2201} = 0.3230$$

$$P(F) = \frac{325}{2201} = 0.1476$$

$$P(S \cap F) = \frac{203}{325} = 0.6246$$

$$P(S)P(F) \neq P(S \cap F)$$

∴ NOT INDEPENDENT

$$c) = \frac{6}{711} = \underline{\underline{0.0084}}$$

$$d) = \frac{655}{711} = \underline{\underline{0.9198}}$$

e) ~~P(A)~~ A: Adult
~~P(C)~~ C: Child
~~P(F)~~ F: First Class

$$\underline{\underline{P(A \cap F) = 197}}$$

$$\underline{\underline{P(A) = 197}}$$

$$\text{Prob of adult and survived} = \frac{655}{711} = 0.9198$$

$$\text{Prob of adult in first class and survived} = \frac{197}{711} = 0.2770$$

$$g) \text{ Prob of adult and in first class} = \frac{197}{2201} = 0.0895 = P(A \cap F)$$

$$\text{Prob of child and in first class} = \frac{6}{2201} = 0.0027 = P(C \cap F)$$

$$\text{Prob of being a child} = \frac{57}{2201} = P(C)$$

$$\text{Prob of being an adult} = \frac{655}{2201} = P(A)$$

$$\text{Prob of being in first class} = \frac{203}{2201} = P(F)$$

$$P(A \cap F) \neq P(A)P(F)$$

$$P(C \cap F) \neq P(C)P(F)$$

∴ NOT INDEPENDENT