Question 3

a) $P(A=T, B=T, C=T, D=T, E=T, F=T, G=T)$

$= 0.5 \cdot 0.2 \cdot 0.377 \cdot 0.5 \cdot 0.78 \cdot 0.7 \cdot 0.45$

$= 0.004631$

b) $P(D=T, A=F, B=T) = P(A=F) \cdot P(B=T) \cdot P(D=T \mid A=F, B=T)$

$= 0.5 \cdot 0.2 \cdot 0.15$

$= 0.015$

c) $P(C=T, D=T) = [P(B=T)P(C=T \mid B=T)\ P(D=T \mid B=T, A=T) P(A=T)$

$+ P(B=T)P(C=T \mid B=T)\ P(D=T \mid B=T, A=F) P(A=F)$

$+ P(B=F)P(C=T \mid B=F)\ P(D=T \mid B=F, A=T) P(A=T)$

$+ P(B=F)P(C=T \mid B=F)\ P(D=T \mid B=F, A=F) P(A=F)]$

$= [0.2 \cdot 0.377 \cdot 0.5 \cdot 0.5$

$+0.2 \cdot 0.377 \cdot 0.15 \cdot 0.5$

$+0.8 \cdot 0.412 \cdot 0.9 \cdot 0.5$

$+0.8 \cdot 0.412 \cdot 0.277 \cdot 0.5]$

$= 0.01885 + 0.005655 + 0.14832 + 0.045650$

$= \boxed{0.218475}$

Question 4

a) Yes, A & B are independent because $P(A \cap B) = P(A) \cdot P(B)$

b) $P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.2 - 0.16$

$= \boxed{0.84}$