

## Question 3:

1)

$$\begin{aligned}
 P(A \wedge B \wedge C \wedge D \wedge E) &= P(E | A \wedge B \wedge C \wedge D) * P(A \wedge B \wedge C \wedge D) \\
 &= P(E | C) * P(A \wedge B \wedge C \wedge D) \\
 &= P(E | C) * P(D | A \wedge B \wedge C) * P(A \wedge B \wedge C) \\
 &= P(E | C) * P(D | A \wedge B) * P(A \wedge B \wedge C) \\
 &= P(E | C) * P(D | A \wedge B) * P(C | A \wedge B) * P(A \wedge B) \\
 &= P(E | C) * P(D | A \wedge B) * P(C | A) * P(A \wedge B) \\
 &= P(E | C) * P(D | A \wedge B) * P(C | A) * P(A) * P(B)
 \end{aligned}$$

2)

$$\begin{aligned}
 P(C=T, D=F) &= \left( \begin{array}{c} P(C=T, D=F | A=T, B=T) \\ + \\ P(C=T, D=F | A=T, B=F) \\ + \\ P(C=T, D=F | A=F, B=T) \\ + \\ P(C=T, D=F | A=F, B=F) \end{array} \right) \\
 &= \left( \begin{array}{c} P(C=T | A=T) * P(D=F | A=T, B=T) * P(A=T) * P(B=T) \\ + \\ P(C=T | A=F) * P(D=F | A=T, B=F) * P(A=T) * P(B=F) \\ + \\ P(C=T | A=T) * P(D=F | A=F, B=T) * P(A=F) * P(B=T) \\ + \\ P(C=T | A=F) * P(D=F | A=F, B=F) * P(A=F) * P(B=F) \end{array} \right) \\
 &= \left( \begin{array}{c} 0.8 * 0.3 * 0.3 * 0.6 \\ + \\ 0.8 * 0.2 * 0.3 * 0.4 \\ + \\ 0.4 * 0.9 * 0.7 * 0.6 \\ + \\ 0.4 * 0.8 * 0.7 * 0.4 \end{array} \right)
 \end{aligned}$$

$$= \begin{pmatrix} 0.0432 \\ + \\ 0.1512 \\ + \\ 0.0192 \\ + \\ 0.0896 \end{pmatrix}$$

$$= \mathbf{0.3032}$$