

Given data 8

$$P(AD) = 0.3 \quad P(BD) = 0.4$$

$$P(CD) = 0.2 \quad P(AS) = 0.4$$

$$P(BS) = 0.35 \quad P(CS) = 0.25$$

$$\begin{aligned} 1. P(D) &= P(AD)P(AS) + P(BD)P(BS) + P(CD)P(CS) \\ &= 0.3 \times 0.4 + 0.4 \times 0.35 + 0.2 \times 0.25 \\ &= 0.31 \end{aligned}$$

$$2. P(BS|D) = \frac{P(D|BS)P(BS)}{P(D|BS)P(BS) + P(D|BS^c)P(BS^c)}$$

$$P(D|BS) = P(BD) = 0.4$$

$$P(BS) = 0.35 \quad P(D|BS^c) = 0.2 + 0.3 = 0.5$$

$$P(BS^c) = 1 - 0.35 = 0.65$$

$$P(BS|D) = 0.307$$

$$\begin{aligned} 3. P(CS \cap D) &= P(CS)P(D|CS) \\ &= P(CS)P(CD) = 0.05 \end{aligned}$$

$$\begin{aligned} 4. P &= P(AS)[1 - P(AD)] + P(BS)[1 - P(BD)] \\ &\quad + P(CS)[1 - P(CD)] \end{aligned}$$

$$= 0.69$$

$$5. P(D^c) = 1 - P(D) = 0.69$$

Part B8

$$6. \sum P(x) = 0.1 + 0.3 + 0.4 + 0.2 = 1 \checkmark \text{ (valid)}$$

$$7. E = 0 \times 0.1 + 0.3 \times 1 + 2 \times 0.4 + 3 \times 0.2 \\ = 1.7$$

$$8. \sigma^2 = \text{Var}(X) = \sum (x - \mu)^2 P(x) \\ = (0 - 1.7)^2 \times 0.1 + (1 - 1.7)^2 \times 0.3 + (2 - 1.7)^2 \times 0.4 \\ + (3 - 1.7)^2 \times 0.2 \\ = 0.81$$

$$\text{Standard deviation } (\sigma) = \sqrt{\sigma^2} = 0.9$$

$$9. P(X \geq 2) = 0.4 + 0.2 = 0.6$$

$$10. E(X) = 1.7 \quad \sigma = 0.9$$

- The data set is fairly with moderate deviation
- most of the data are fairly close to the mean.