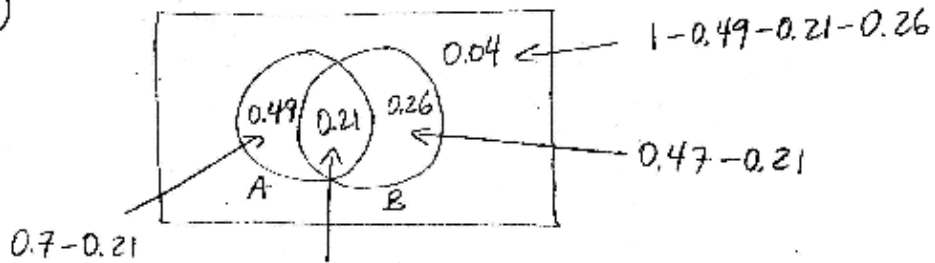


## Solutions

①



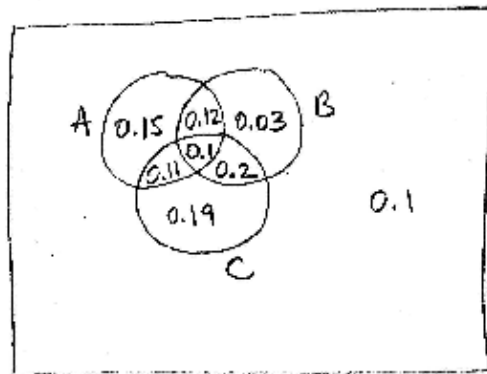
start here

$$P(A \cap B) = 0.21$$

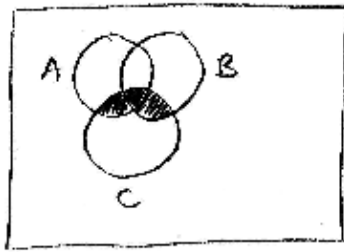
②

- a)  $P(\bar{B}) = 1 - P(B) = 0.53$   
b)  $P(A \cup B) = 0.49 + 0.21 + 0.26 = 0.96$   
c)  $P(A \cap \bar{B}) = 0.49$

③



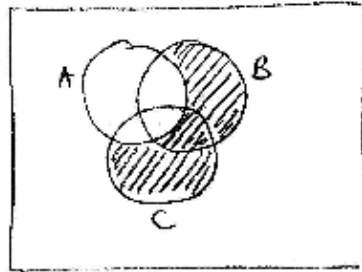
④ a)



$$(A \cup B) \cap C$$

$$P((A \cup B) \cap C) = 0.11 + 0.1 + 0.2 = 0.41$$

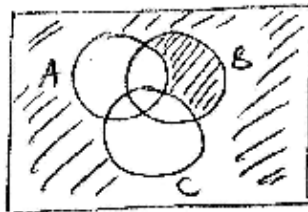
b)



$$(B \cup C) \cap \bar{A}$$

$$P((B \cup C) \cap \bar{A}) = 0.03 + 0.2 + 0.19 = 0.42$$

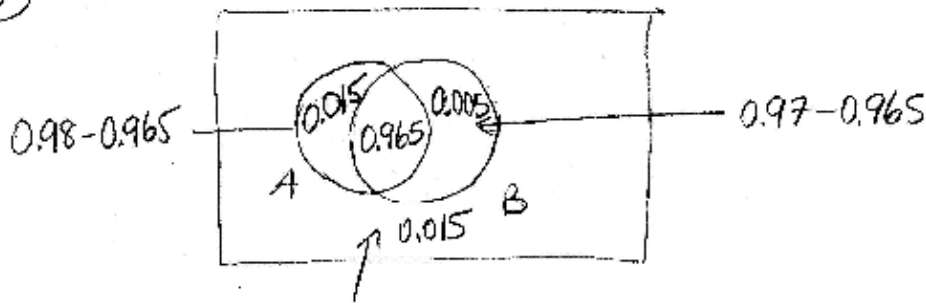
c)



$$\bar{A} \cap C$$

$$P(\bar{A} \cap C) = 0.03 + 0.1 = 0.13$$

5



$$1 - 0.015 - 0.965 = 0.005$$

a)  $P(\text{detected by at least one})$   
 $= 0.015 + 0.965 + 0.005$   
 $= 0.985$

b)  $P(\text{detected by neither})$   
 $= 0.015$

6

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

$$A = \{HTT, HTH, HHT, HHH\}$$

$$B = \{HHT, HTH, TTH\}$$

$$A \cap B = \{HHT, HTH\}$$

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

$$A \cup B = \{HTT, HTH, HHT, HHH, TTH\}$$

b)  $P(B) = \frac{3}{8} = 0.375$

c)  $P(A \cap B) = \frac{n(A \cap B)}{n(S)} = \frac{2}{8} = 0.25$

d)  $P(A \cup B) = \frac{n(A \cup B)}{n(S)} = \frac{5}{8} = 0.625$

e)  $P(\bar{A}) = 1 - P(A) = 0.5$

$$\textcircled{7} \quad n(S) = 52C3$$

$$a) \quad P(\text{at least one heart})$$

$$= 1 - P(\text{no hearts})$$

$$= 1 - \frac{39C3}{52C3}$$

39 non-hearts to  
choose from

$$\approx 0.59$$

$$b) \quad P(\text{not all hearts})$$

$$= 1 - P(\text{all hearts})$$

$$= 1 - \frac{13C3}{52C3}$$

$$\approx 0.99$$

$$\textcircled{8} \quad n(S) = 6 \times 6 \times 6 = 6^3$$

$$P(\text{sum} \geq 5) = 1 - P(\text{sum} < 5)$$

ways rolls can sum  
to < 5:

{111, 112, 121, 211}

$$n(A) = 4$$

$$= 1 - \frac{4}{6^3}$$

$$\approx 0.98$$

$$(9) \quad n(S) = 2 \times 2 \times \dots \times 2 = 2^8$$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$n(\text{begin 001 or end 11})$$

$$= n(\text{begin 001}) + n(\text{end 11}) - n(\text{begin 001 and end 11})$$

$$= 2^5 + 2^6 - 2^3$$

$$\begin{array}{ccc} \text{001} \text{-----} & \text{-----} \text{11} & \text{001} \text{-----} \text{11} \\ \text{(2} \times \text{2} \times \text{2} \times \text{2} \times \text{2)} & \text{(2} \times \dots \times \text{2)} & \text{(2} \times \text{2} \times \text{2)} \end{array}$$

$$= 88$$

$$P(\text{begin 001 or end 11}) = \frac{88}{2^8} \approx 0.34$$

$$(10) \quad a) \quad n(S) = 365 \times 365$$

$$P(A) = \frac{365 \times 364}{365^2} \approx 0.997$$

$$b) \quad P(A) = \frac{365 \times 364 \times 363}{365^3} \approx 0.99$$

$$c) \quad P(A) = \frac{365 P_n}{365^n} \quad \text{or} \quad \frac{365 \times 364 \times \dots \times (365 - n + 1)}{365^n}$$

$$d) \quad P(\text{at least two share}) = 1 - P(\text{all different}) \\ = 1 - \frac{365 P_n}{365^n}$$