

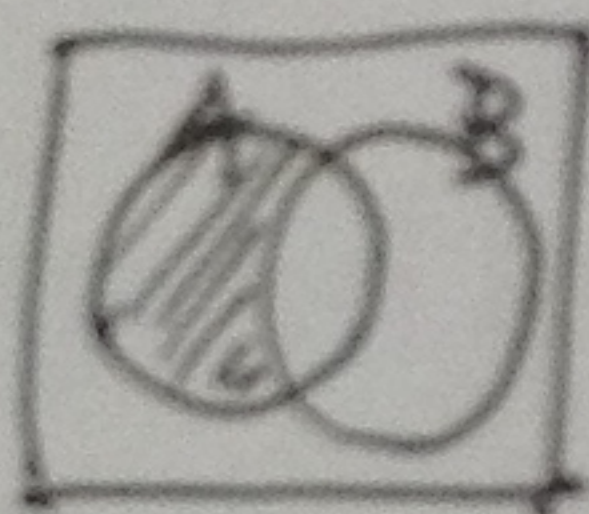
$$2.23 \quad P(\{d\}) = \frac{1}{8}$$

$$P(\{c\}) = P(\{c, d\}) - P(\{d\}) = \frac{3}{8} - \frac{1}{8} = \frac{1}{4}$$

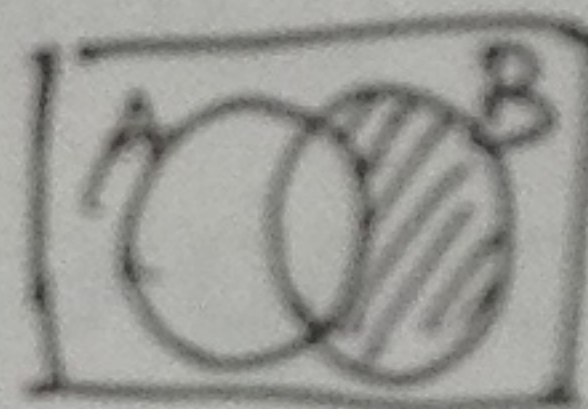
$$P(\{b\}) = P(\{b, c\}) - P(\{c\}) = \frac{6}{8} - \frac{2}{8} = \frac{1}{2}$$

$$P(\{a\}) = 1 - \frac{1}{8} - \frac{1}{4} - \frac{1}{2} = \frac{1}{8}$$

$$2.24 \quad (a) \quad P(A \cap B^c) = P(A) - P(A \cap B)$$

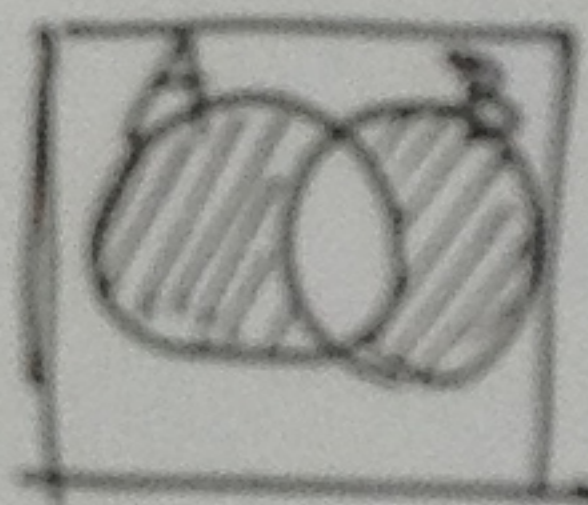


$$P(B \cap A^c) = P(B) - P(A \cap B)$$



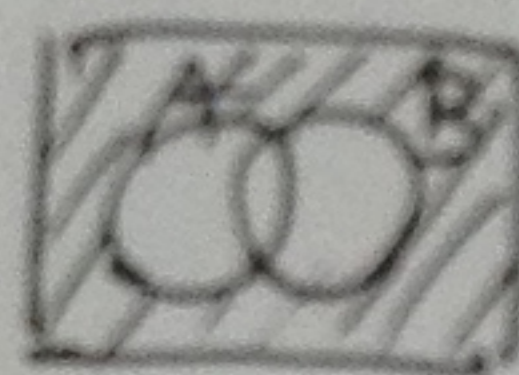
(b)

$$P(A \Delta B) = P(A) + P(B) - 2P(A \cap B)$$



$$(c) \quad P((A \cup B)^c) = 1 - P(A \cup B)$$

$$= 1 - [P(A) + P(B) - P(A \cap B)]$$



$$2.28 \quad (a) \quad P(A_1) = \frac{1}{2}$$

$$P(A_1 \cap A_2) = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$P(A_1 \cap A_2 \cap A_3) = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$$

$$P(A_1 \cup A_2 \cup A_3) = 1 - P(\text{no 1's in the 3 bits}) = 1 - \left(\frac{1}{2}\right)^3 = \frac{7}{8}$$

(b) Assume the head is with probability  $p$ .

$$P(A_1) = p$$

$$P(A_1 \cap A_2) = p^2$$

$$P(A_1 \cap A_2 \cap A_3) = p^3$$

$$P(A_1 \cup A_2 \cup A_3) = 1 - (1-p)^3 = p^3 + 3p^2 + 3p$$