

1) Roll 6-sided die (EXPERIMENT)

$A = \{\text{Roll is even}\} = \{2, 4, 6\}$

$B = \{\text{Roll is } > 3\} = \{4, 5, 6\}$

$(A \cup B)^c = (\{2, 4, 6\} \cup \{4, 5, 6\})^c = (\{2, 4, 5, 6\})^c = \{1, 3, 5\} \cap \{1, 2, 3\} = \{1, 3\} = A^c \cap B^c \checkmark$

$(A \cap B)^c = (\{2, 4, 6\} \cap \{4, 5, 6\})^c = (\{4, 6\})^c = \{1, 2, 3, 5\} = \{1, 2, 5\} \cup \{1, 2, 3\} = A^c \cup B^c \checkmark$

a) $A^c = (A^c \cap B) \cup (A^c \cap B^c) = A^c \cap (B \cup B^c) = A^c \cap \Omega = A^c$

$B^c = (A \cap B^c) \cup (A^c \cap B^c) = (A \cap A^c) \cap B^c = \Omega \cap B^c = B^c$

b) $(A \cap B)^c = (A^c \cap B) \cup (A \cap B^c) \cup (A^c \cap B^c)$

$(A \cap B)^c = A^c \cup B^c$

From a) $A^c = (A^c \cap B) \cup (A^c \cap B^c) \Rightarrow (A^c \cap B) \cup (A^c \cap B^c) \cup (A \cap B^c) \cup (A \cap B^c)$

$B^c = (A \cap B^c) \cup (A^c \cap B^c)$

$= (A^c \cap B) \cup (A^c \cap B^c) \cup (A \cap B^c)$

c) $A = \{1, 3, 5\}$

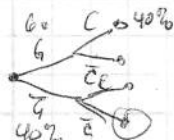
$B = \{1, 2, 3\}$

$(A \cap B)^c = (\{1, 3, 5\} \cap \{1, 2, 3\})^c = (\{1, 3\})^c = \{2, 4, 5, 6\}$

$(A^c \cap B) \cup (A \cap B^c) \cup (A^c \cap B^c) = (\{2, 4, 6\} \cap \{1, 2, 3\}) \cup (\{1, 3, 5\} \cap \{4, 5, 6\}) \cup (\{1, 3, 5\} \cap \{4, 5, 6\}) = (\{2\} \cup \{4, 6\} \cup \{5\}) = \{2, 4, 5, 6\}$

5) $P(B) = 40\%$
 $P(G) = 60\%$
 $P(C) = 70\%$

$B = G \cup C$



$60 \times P(C|G) = 40$

$P(C|G) = 2/3$

$P(G|C) = 1/3$

$P(\bar{G}|C) = \frac{P(\bar{G} \cap C)}{P(C)}$

$= \frac{P((G \cup C)^c) \cap C}{P(C)} = \frac{(P(G) + P(C) - P(G \cap C))^c \cap C}{P(C)} = \frac{(90\%)^c \cap C}{P(C)} = \frac{10\%}{70\%} = \frac{1}{7}$

$P(G^c \cap C^c) = 1 - P(G \cup C) = 1 - (.9)$

6) EXPERIMENT 1 Roll of die

$\Omega = \{1, 2, 3, 4, 5, 6\}$

$P(1) = 1/6$

$P(2) = 2/6$

$P(3) = 1/6$

$P(4) = 2/6$

$P(5) = 1/6$

$P(6) = 2/6$

$P(<4) = P(1) + P(2) + P(3) = 4/6$

14) a) $P(1_2 | 1_1) = P(1)P(1_2 | 1_1) = 1/6 \times 1/6 = 1/36$

$P(\text{Doubles}) = 4/36$

b) $P(\text{sum} \leq 4) = 4/36 = 1/9$

$P(\text{Doubles} | \text{sum} \leq 4) = \frac{P(\text{Doubles} \cap \text{sum} \leq 4)}{P(\text{sum} \leq 4)} = \frac{2/36}{4/36} = 1/2$

c) $P(\text{AT LEAST } 6) = 11/36$

d) $P(\text{DIFF}) = 5/6$

$P(6 | \text{DIFF}) = \frac{P(6 \cap \text{DIFF})}{P(\text{DIFF})} = \frac{10/36}{5/6} = 2/3$