$P(A) = \frac{1}{2}$ $P(B) = \frac{1}{3}$ $P(A \cap B) = \frac{1}{4}$

$$P(A|B) = \frac{|A \cap B|}{|B|}$$

$$P(B|A) = \frac{P(A|B)P(B)}{P(A)}$$

a) $\frac{\frac{1}{4}}{\frac{1}{3}} = \frac{3}{4}$ ✓, $\frac{\frac{3}{4} \times \frac{1}{3}}{\frac{1}{2}} = \frac{1}{2}$ ✓

b) $P(A^c|B) = 1 - P(A|B) = 1 - \frac{3}{4} = \frac{4-3}{4} = \frac{1}{4}$ ✓

$$P(B^c|A) = \frac{P(A^c|B)P(A)}{P(B)}$$

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

$$P(A \cap B) = P(A) \cdot P(B|A)$$

c) $P(A^c | B^c) = \dfrac{P(A^c \cap B^c)}{P(B^c)}$

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

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

$1_1 + \frac{1}{3} - \frac{1}{4} = \frac{7}{12} \Rightarrow (A \cup B)^c = 1 - \frac{7}{12} = \frac{5}{12}$

$P(A^c | B^c) = \dfrac{\frac{5}{12}}{\frac{2}{3}} = \frac{5}{8}$

$P(B^c) = 1 - P(B) = \frac{2}{3}$

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

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c) $P(A^c \mid B^c) = \dfrac{P(A^c \cap B^c)}{P(B^c)}$

$$P(B^c \mid A^c) = \frac{P(A^c \mid B^c)\,P(B^c)}{P(A^c)}$$

$$P(B^c \mid A^c) = \frac{5/8 \times 1/3}{1/2} = \frac{5}{6}$$ ✓

$P(A) = 1/4$ $P(A \cup B) = 1/3$

a) A y B independientes

b)

$$P(A \cup B) = P(A) + P(B)$$

$$P(A \cup B) - P(A) = P(B)$$

$$1/3 - 1/4 = P(B)$$

$$\frac{1}{12} = P(B)$$