# Quiz 2 Solution

Pollution of the rivers in the United States has been a problem for many years. Consider the following events:

$$A = \{\text{The river is polluted.}\}$$
$$B = \{\text{A sample of water tested detects pollution.}\}$$

Assume $P(A) = 0.3$, $P(B|A) = 0.75$, $P(B|A') = 0.20$.

(a) Find $P(A \cap B)$.

(b) Find $P(A' \cap B)$.

(c) Find $P(A|B)$.

**Solution.**

(a) $P(A \cap B) = P(B|A)P(A) = 0.75 \cdot 0.3 = 0.225$.

(b) $P(A' \cap B) = P(B|A')P(A') = 0.2 \cdot (1 - 0.3) = 0.14$.

(c) $P(A|B) = \frac{P(A \cap B)}{P(B)}$. Since $P(B) = P(A \cap B) + P(A' \cap B) = 0.225 + 0.14 = 0.365$, we have $P(A|B) = \frac{0.225}{0.365} = \frac{45}{73} \approx 0.62$.