Assignment 66-2

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Part A

-70% of customers buy a coffee-40% of customers buy a cake-20% of customers buy a cake and a coffe

Given that a customer has bought a cake what is the probability that they will buy a cake?

This is the same as $P(\text{coffee} | \text{cake}) = \frac{P(\text{coffee} \cap \text{cake})}{P(\text{cake})} = \frac{0.2}{0.4} = 0.5 = 50\%$

Part B



Find P(A|B)

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.2}{0.35} = \frac{4}{7}$$

Find P(C|B)

$$P(C|B) = \frac{P(C \cap B)}{P(B)} = \frac{0.15}{0.35} = \frac{3}{7}$$

Find $P(B|A \cup C)$

$$P(B|A \cup C) = \frac{P(B \cap A \cup C)}{P(A \cup C)} = \frac{0.25}{0.7} = \frac{5}{14}$$

Find $P(B|A,C) = P(B|A \cap C)$

$$P(B|A\cap C) = \frac{P(B\cap A\cap C)}{P(A\cap C)} = \frac{0.1}{0.2} = \frac{1}{2}$$

Part C

A real number X is selected randomly on the uniform distribution [0,10]

Find $P(2 \le X \le 5)$

$$P(0 < x < 10) = 1 \Rightarrow \int_0^{10} k dx = 1 \Rightarrow k(10) = 1 \Rightarrow k = \frac{1}{10}$$

$$P(2 \le X \le 5) = \int_{2}^{5} \frac{1}{10} dx = \frac{5}{10} - \frac{2}{10} = 3/10$$

Find $P(X \le 2 | X \le 5)$

$$P(X \le 2 | X \le 5) = \frac{P(X \le 2 \cap X \le 5)}{P(X \le 5)} = \frac{\frac{2}{5}}{\frac{5}{10}} = \frac{4}{5}$$

Find $P(3 \le X \le 8 | X \ge 4)$

$$P(3 \le X \le 8 | X \ge 4) = \frac{P(4 \le X \le 8)}{P(X \ge 4)} = \frac{\frac{4}{10}}{\frac{6}{10}} = \frac{2}{3}$$