## 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 $\mathrm{P}($ coffee $\mid$ cake $)=\frac{P(\text { coffee } \cap \text { cake })}{P(\text { cake })}=\frac{0.2}{0.4}=0.5=50 \%$

## Part B



Find $\mathrm{P}(\mathrm{A} \mid \mathrm{B})$

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

Find $\mathrm{P}(\mathrm{C} \mid \mathrm{B})$

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

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

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

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

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

## Part C

A real number X is selected randomly on the uniform distribution $[0,10]$
Find $P(2 \leq X \leq 5)$

$$
\begin{gathered}
P(0<x<10)=1 \Rightarrow \int_{0}^{10} k d x=1 \Rightarrow k(10)=1 \Rightarrow k=\frac{1}{10} \\
P(2 \leq X \leq 5)=\int_{2}^{5} \frac{1}{10} d x=\frac{5}{10}-\frac{2}{10}=3 / 10
\end{gathered}
$$

Find $P(X \leq 2 \mid X \leq 5)$

$$
P(X \leq 2 \mid X \leq 5)=\frac{P(X \leq 2 \cap X \leq 5)}{P(X \leq 5)}=\frac{\frac{2}{5}}{\frac{5}{10}}=\frac{4}{5}
$$

Find $P(3 \leq X \leq 8 \mid X \geq 4)$

$$
P(3 \leq X \leq 8 \mid X \geq 4)=\frac{P(4 \leq X \leq 8)}{P(X \geq 4)}=\frac{\frac{4}{10}}{\frac{6}{10}}=\frac{2}{3}
$$

