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Module 1 Quiz

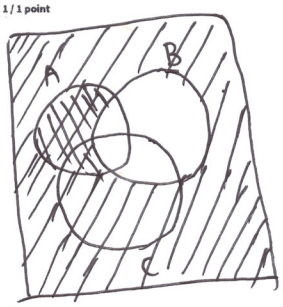
Latest Submission Grade 100%

1. **Prompt 1:** For each of the following scenarios, find the requested probability. Assume the sets A, B, and C are events from the same sample space S. (Hint: Venn diagrams may help with the visualization, although they are not required to answer the questions.)

1 / 1 point

If $P(A) = .4$, $P(B^c) = .7$, and $P(A \cap B^c) = .2$, find $P(A \cap B)$

$P(A \cap B) = P(A) - P(A \cap B^c)$
$= 0.2$



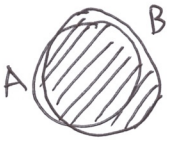
0.2

Correct

2. **Prompt 1:** For each of the following scenarios, find the requested probability. Assume the sets A, B, and C are events from the same sample space S. (Hint: Venn diagrams may help with the visualization, although they are not required to answer the questions.)

1 / 1 point

If $P(A) = 0.9$ and $P(B) = 0.9$, what is the lower bound for $P(A \cup B)$.



0.9

Correct

3. **Prompt 2:** Three popular options on a certain type of car are A leather seats, B a sunroof, and C heated seats. In the past, $P(A) = 0.55$ (i.e. 55% of the customers have requested option A), $P(B) = 0.45$, $P(C) = 0.4$. Furthermore, $P(A \cap B) = 0.25$, $P(A \cap C) = 0.2$, $P(B \cap C) = 0.15$ and $P(A \cap B \cap C) = 0.1$.

1 / 1 point

Find the probability that a customer will ask for at least one of the three options.

$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C)$
$- P(A \cap C) + P(A \cap B \cap C) = .55 + .45$
$+ .9 - .25 - 0.2$
$- 0.15 + 0.1$
$= 0.9$

0.9

Correct

4. **Prompt 2:** Three popular options on a certain type of car are A leather seats, B a sunroof, and C heated seats. In the past, $P(A) = 0.55$ (i.e. 55% of the customers have requested option A), $P(B) = 0.45$, $P(C) = 0.4$. Furthermore, $P(A \cap B) = 0.25$, $P(A \cap C) = 0.2$, $P(B \cap C) = 0.15$ and $P(A \cap B \cap C) = 0.1$.

1 / 1 point

Find the probability that a customer will not ask for any of these three options.

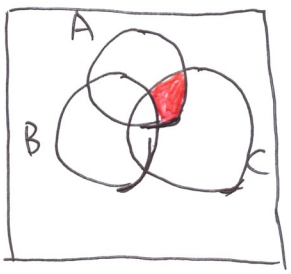
$= 1 - P(A \cup B \cup C) = 1 - 0.9 = 0.1$

0.1

Correct

5. **Prompt 2:** Three popular options on a certain type of car are A leather seats, B a sunroof, and C heated seats. In the past, $P(A) = 0.55$ (i.e. 55% of the customers have requested option A), $P(B) = 0.45$, $P(C) = 0.4$. Furthermore, $P(A \cap B) = 0.25$, $P(A \cap C) = 0.2$, $P(B \cap C) = 0.15$ and $P(A \cap B \cap C) = 0.1$.

1 / 1 point



Find the probability that a customer will ask for heated leather seats but not a sunroof.

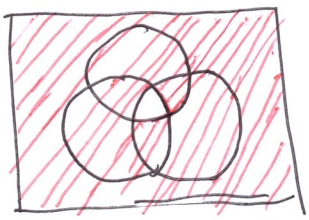
$P(A \cap C) - P(A \cap B \cap C)$
$= 0.2 - 0.1 = 0.1$

0.1

Correct

6. **Prompt 2:** Three popular options on a certain type of car are A leather seats, B a sunroof, and C heated seats. In the past, $P(A) = 0.55$ (i.e. 55% of the customers have requested option A), $P(B) = 0.45$, $P(C) = 0.4$. Furthermore, $P(A \cap B) = 0.25$, $P(A \cap C) = 0.2$, $P(B \cap C) = 0.15$ and $P(A \cap B \cap C) = 0.1$.

1 / 1 point



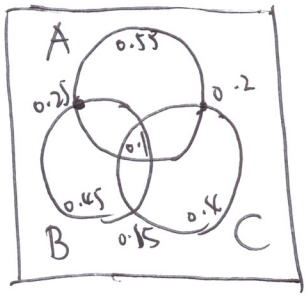
Find the probability that a customer will ask for at most two of the options.

→ cannot be all 3

$1 - P(A \cap B \cap C) = 0.9$

0.9

Correct



7. **Prompt 2:** Three popular options on a certain type of car are A leather seats, B a sunroof, and C heated seats. In the past, $P(A) = 0.55$ (i.e. 55% of the customers have requested option A), $P(B) = 0.45$, $P(C) = 0.4$. Furthermore, $P(A \cap B) = 0.25$, $P(A \cap C) = 0.2$, $P(B \cap C) = 0.15$ and $P(A \cap B \cap C) = 0.1$.

1 / 1 point

Find the probability that a customer will ask for exactly two of the options.

$P(A \text{ and } B \text{ only}) + P(B \text{ and } C \text{ only})$
$+ P(A \text{ and } C \text{ only}) = (0.25 - 0.1) + (0.15 - 0.1)$
$+ (0.2 - 0.1) = 0.3$

0.3

Correct

8. **Prompt 3:** A message of length 5 digits is to be sent. Each digit can be a 0, 1, or 2. **1 / 1 point**

What is the cardinality of the sample space?

243

Correct

$3^5 = 243$

9. **Prompt 3:** A message of length 5 digits is to be sent. Each digit can be a 0, 1, or 2. **1 / 1 point**

If every message is equally likely, what is the probability that the message consists of 2 zeros, 2 ones, and 1 two? Round your answer to have four decimal places.

0.1235

Correct

$$\frac{\frac{5!}{2!2!1!}}{3^5}$$

10. **Prompt 3:** A message of length 5 digits is to be sent. Each digit can be a 0, 1, or 2. **1 / 1 point**

What is the probability that the message contains at least one zero? Round your answer to have three decimal places.

0.868

Correct

$$1 - \frac{2^5}{243}$$

$$= 0.868$$

No zero

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

2^5 ways

$$nP_r = \frac{n!}{(n-r)!}$$

n = total # of objects

r = # of objects selected

$$nC_r = \frac{n!}{r!(n-r)!}$$

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permutation of multi-sets

P_1 objects among 'n' objects are similar

P_2 objects of the second kind are similar

P_3 . . . . . third . . . . . .

Permutation is given as: $\frac{n!}{P_1! \cdot P_2! \cdot P_3! \ldots P_n!}$