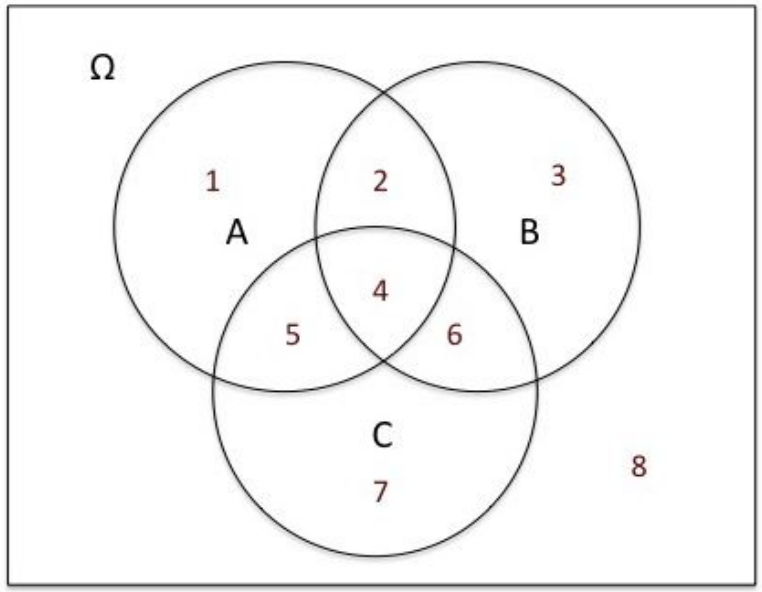
Problem 1: Venn diagrams

(5/5 points)

In this problem, you are given descriptions in words of certain events (e.g., "at least one of the events A, B, C occurs"). For each one of these descriptions, identify the correct symbolic description in terms of A, B, C from Events E1-E7 below. Also identify the correct description in terms of regions (i.e., subsets of the sample space Ω) as depicted in the Venn diagram below. (For example, Region 1 is the part of A outside of B and C.)

and independence

- Unit 3: Counting
- Unit 4: Discrete random variables
- Exam 1
- Unit 5: Continuous random variables
- Unit 6: Further topics on random variables
- Unit 7: Bayesian inference
- Exam 2
- Unit 8: Limit theorems and classical statistics
- Unit 9: Bernoulli and Poisson processes



Symbolic descriptions:

- Event E1: $A \cap B \cap C$
- Event E2: $(A \cap B \cap C)^c$
- Event E3: $A \cap B \cap C^c$
- Event E4: $B \cup (B^c \cap C^c)$
- Event E5: $A^c \cap B^c \cap C^c$

- Unit 10: Markov chains
- Exit Survey
- Final Exam

- Event E6: $(A \cap B) \cup (A \cap C) \cup (B \cap C)$
- Event E7: $(A \cap B^c \cap C^c) \cup (A^c \cap B \cap C^c) \cup (A^c \cap B^c \cap C)$

1. At least two of the events A, B, C occur.

Event E6 ▾ ✔ **Answer:** Event E6

Regions: 2 4 5 6 ▾ ✔ **Answer:** Regions: 2 4 5 6

2. At most two of the events A, B, C occur.

Event E2 ▾ ✔ **Answer:** Event E2

Regions: 1 2 3 5 6 7 8 ▾ ✔ **Answer:** Regions: 1 2 3 5 6 7 8

3. None of the events A, B, C occurs.

Event E5 ▾ ✔ **Answer:** Event E5

Region: 8 ▾ ✔ **Answer:** Region: 8

4. All three events A, B, C occur.

Event E1 ✔ **Answer:** Event E1

Region: 4 ✔ **Answer:** Region: 4

5. Exactly one of the events A, B, C occurs.

Event E7 ✔ **Answer:** Event E7

Regions: 1 3 7 ✔ **Answer:** Regions: 1 3 7

6. Events A and B occur, but C does not occur.

Event E3 ✔ **Answer:** Event E3

Region: 2 ✔ **Answer:** Region: 2

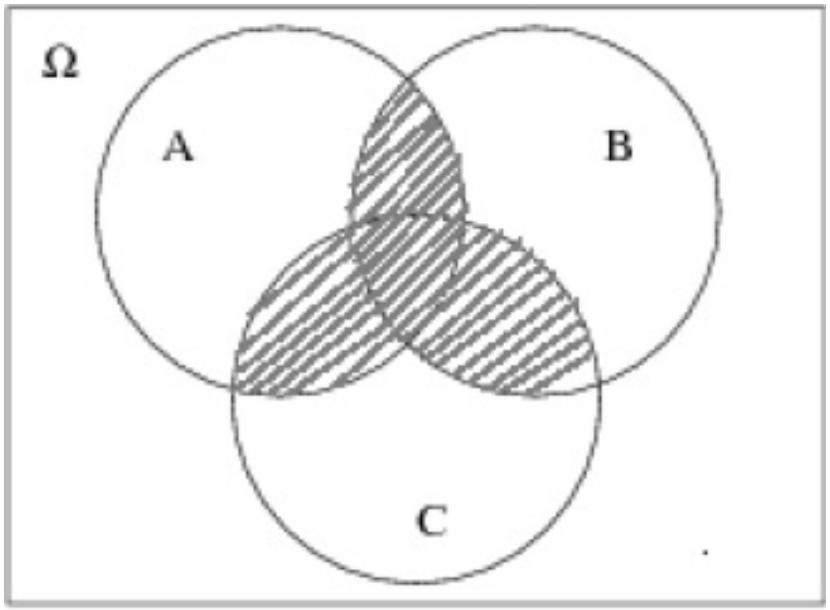
7. Either event B occurs or, if not, then C also does not occur.

Event E4 ✔ **Answer:** Event E4

Regions: 1 2 3 4 6 8 ✔ **Answer:** Regions: 1 2 3 4 6 8

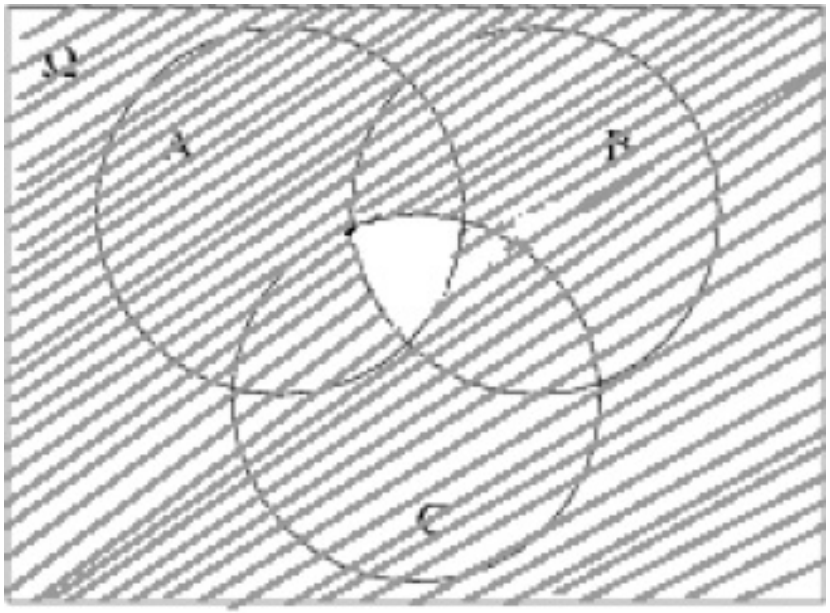
Answer:

1. At least two of the events A, B, C occur:
   $(A \cap B) \cup (A \cap C) \cup (B \cap C)$



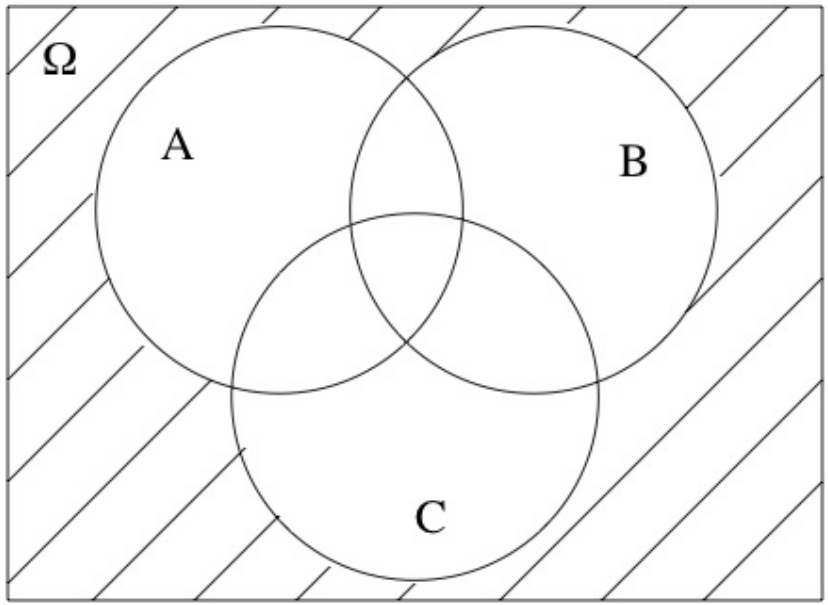
(a)

2. At most two of the events A, B, C occur:
   $(A \cap B \cap C)^c$



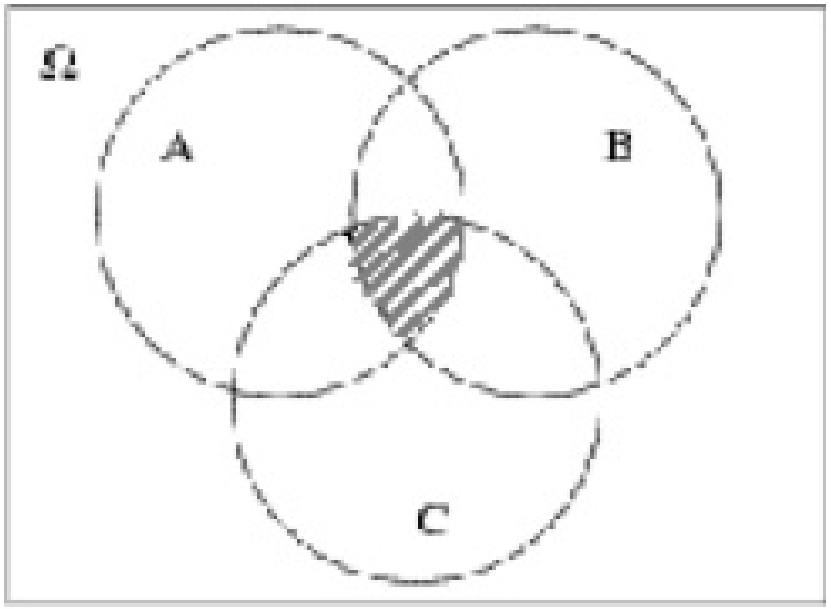
(b)

3. None of the events A, B, C occurs:
$A^c \cap B^c \cap C^c$



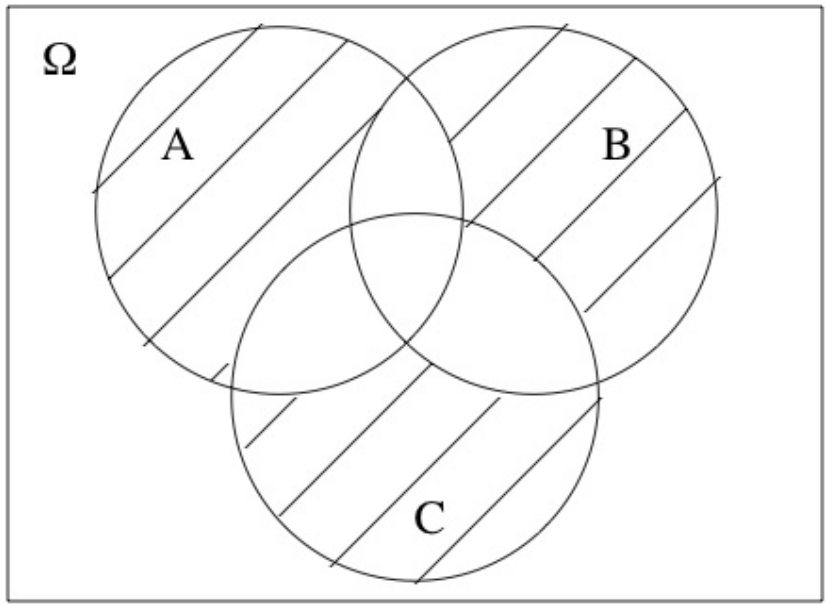
(c)

4. All three events A, B, C occur:
$A \cap B \cap C$



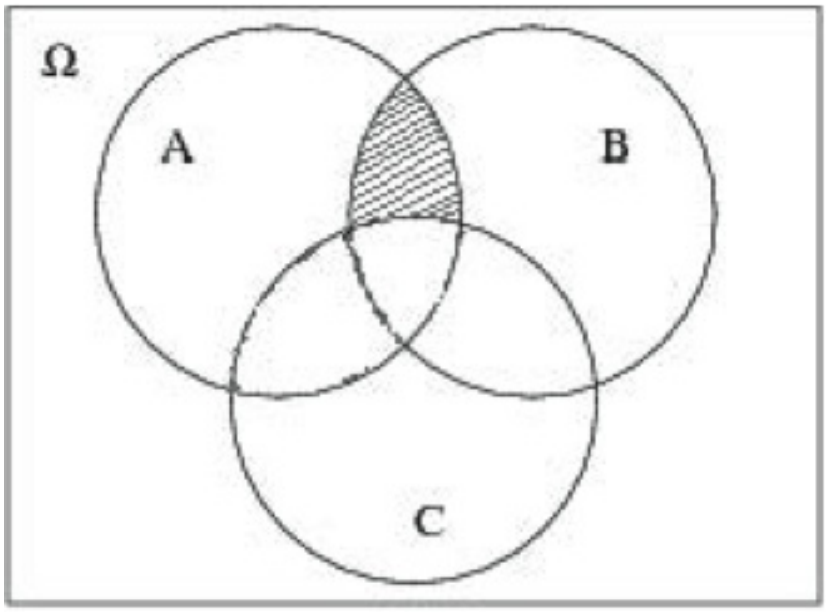
(d)

5. Exactly one of the events A, B, C occurs:
$(A \cap B^c \cap C^c) \cup (A^c \cap B \cap C^c) \cup (A^c \cap B^c \cap C)$



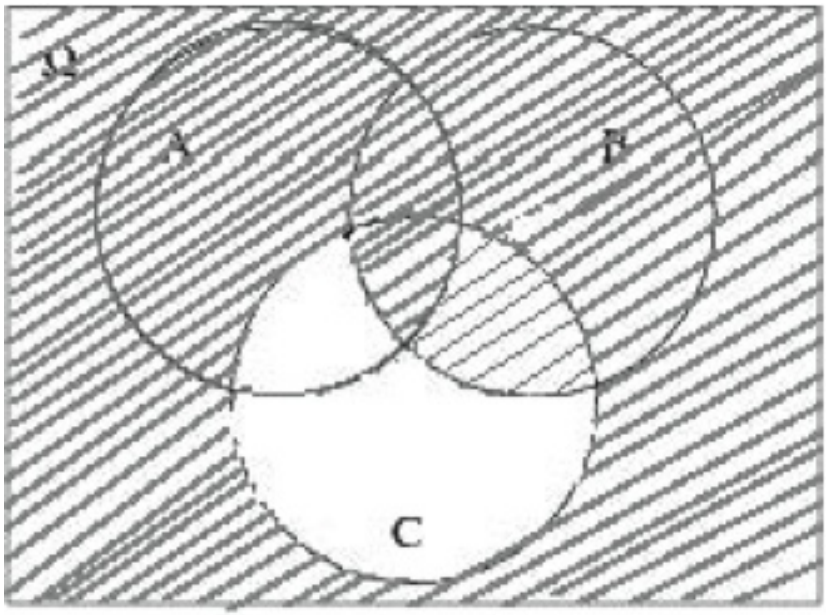
(e)

6. Events A and B occur, but C does not occur:
$A \cap B \cap C^c$



(f)

7. Either event B occurs or, if not, then C also does not occur:
$B \cup (B^c \cap C^c)$



(g)

You have used 1 of 3 submissions

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DISCUSSION

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