




MITx: 6.041x Introduction to Probability - The Science of Uncertainty



Bookmarks


- ▶ Unit 0: Overview
- ▶ Entrance Survey
- ▼ Unit 1: Probability models and axioms

Lec. 1: Probability models and axioms

Exercises 1 due Feb 10, 2016 at 23:59 UTC 

Mathematical background: Sets; sequences, limits, and series; (un)countable sets.

Solved problems**Problem Set 1**

Problem Set 1 due Feb 10, 2016 at 23:59 UTC 

- ▶ Unit 2: Conditioning

Unit 1: Probability models and axioms > Problem Set 1 > Problem 1 Vertical: Venn diagrams

 Bookmark

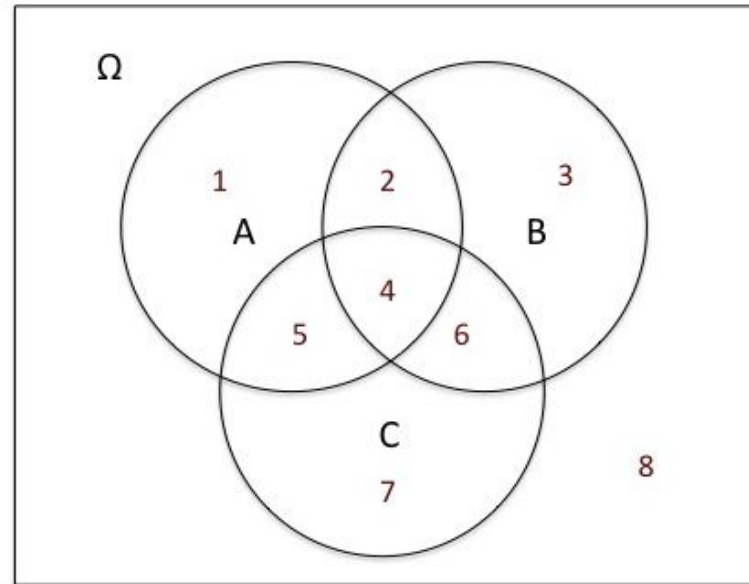
Problem 1: Venn diagrams

(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 ▾

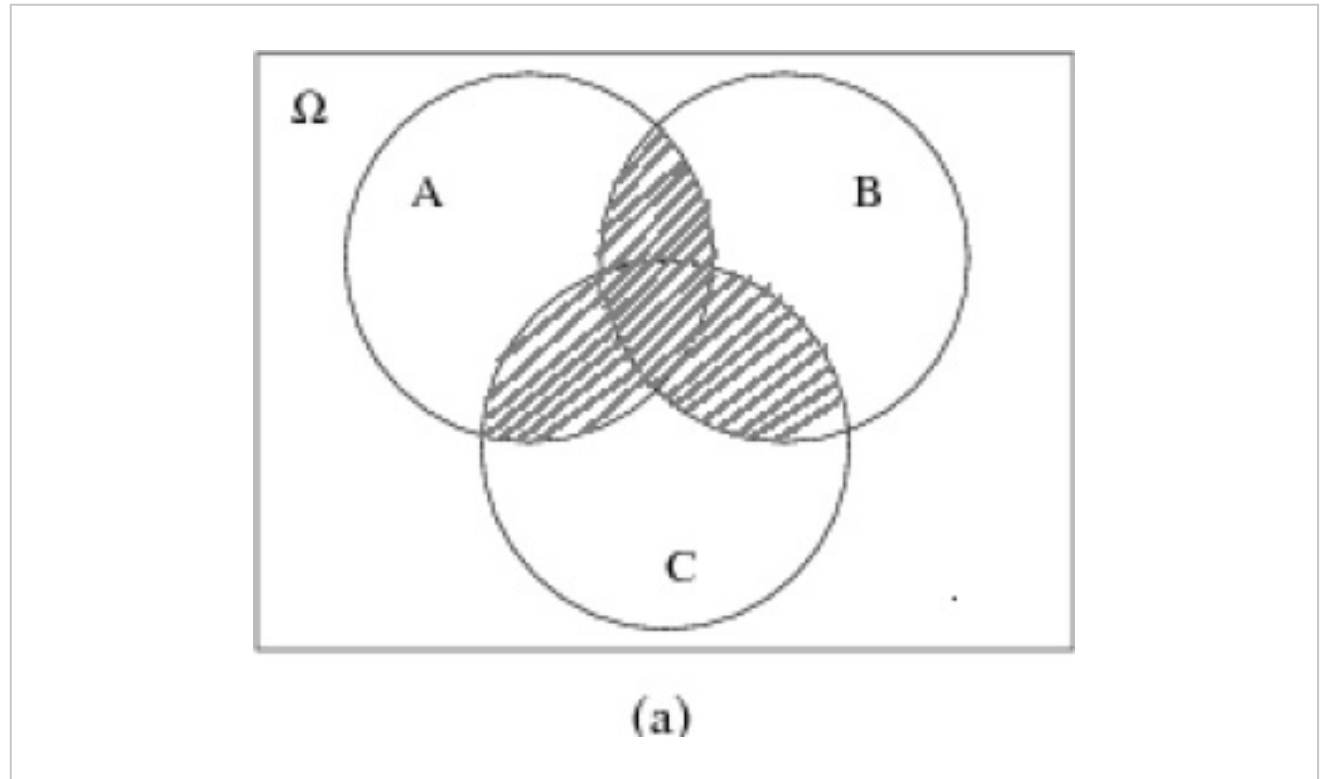


Answer: Regions: 1 2 3 4 6 8

Answer:

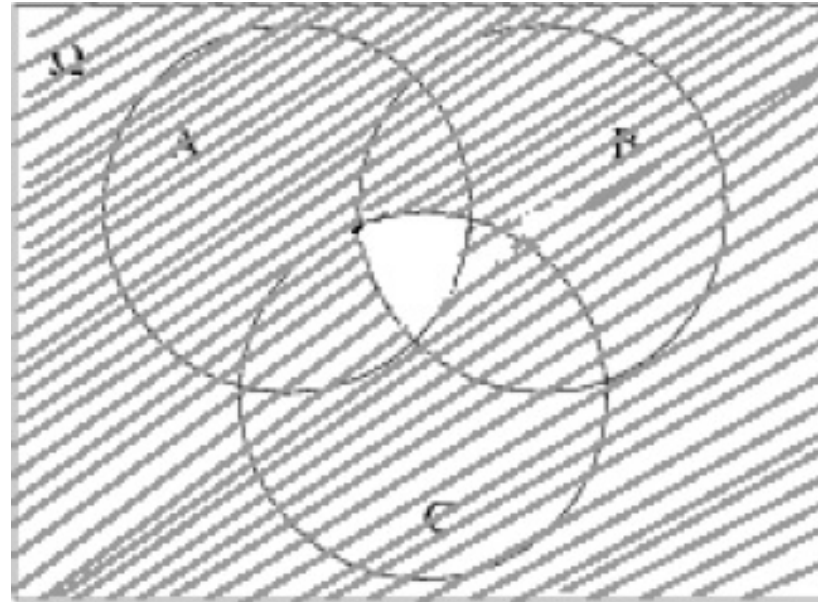
1. At least two of the events A, B, C occur:

$$(A \cap B) \cup (A \cap C) \cup (B \cap C)$$



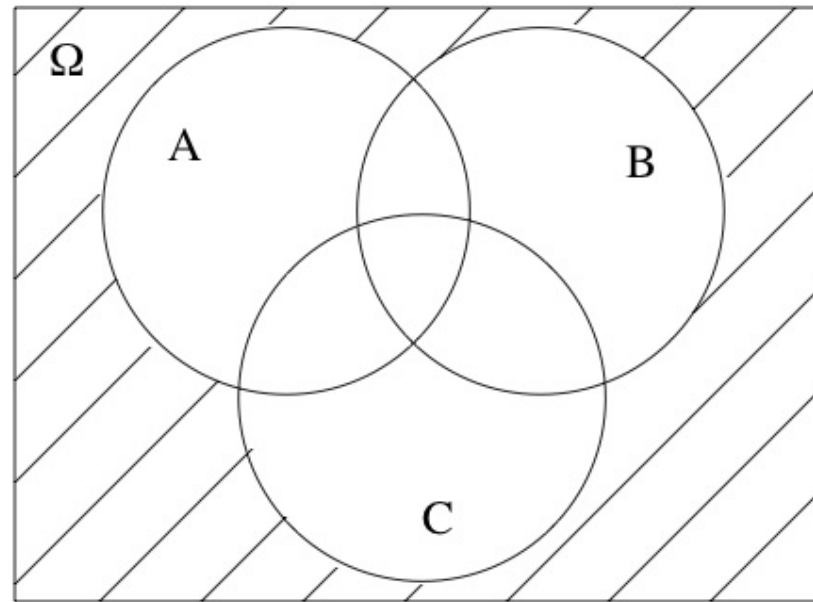
2. At most two of the events A, B, C occur:

$$(A \cap B \cap C)^c$$



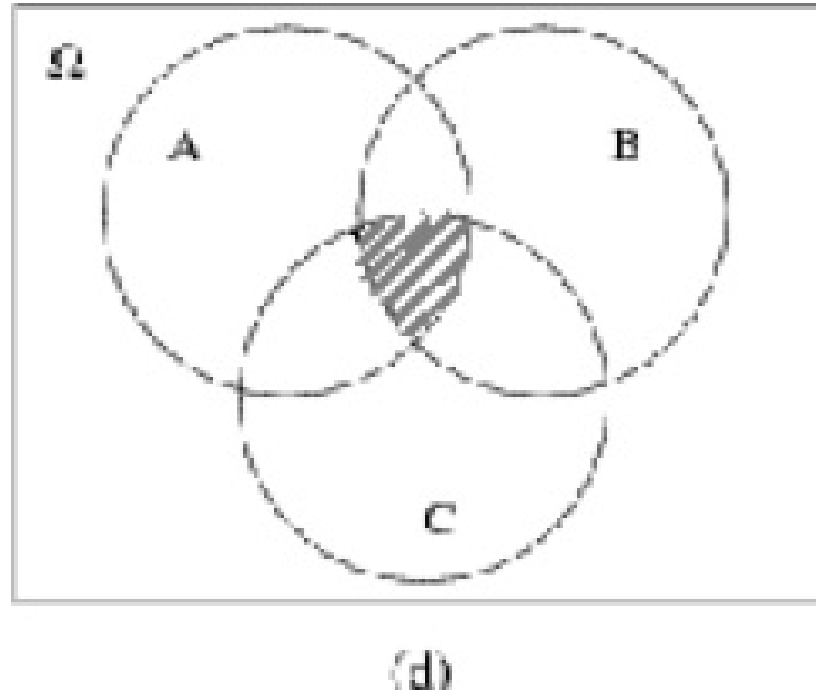
(b)

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

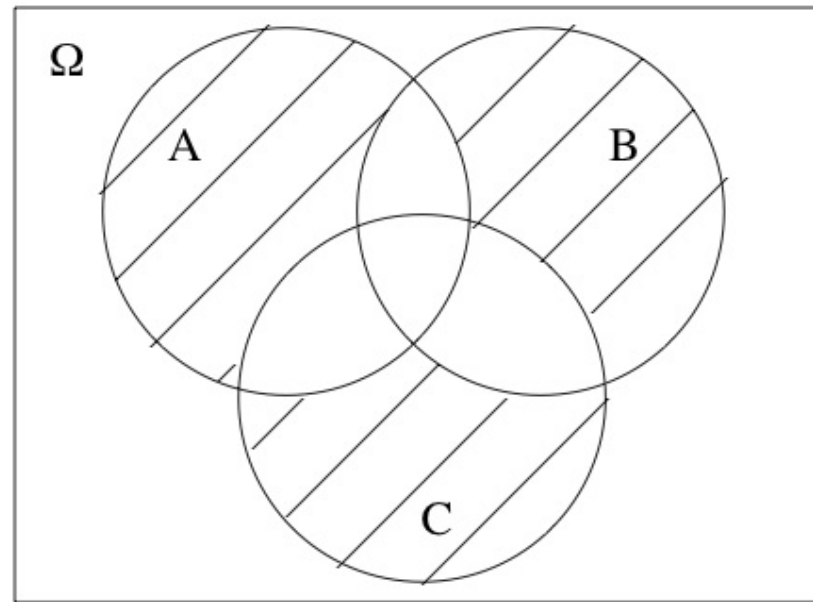


(c)

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

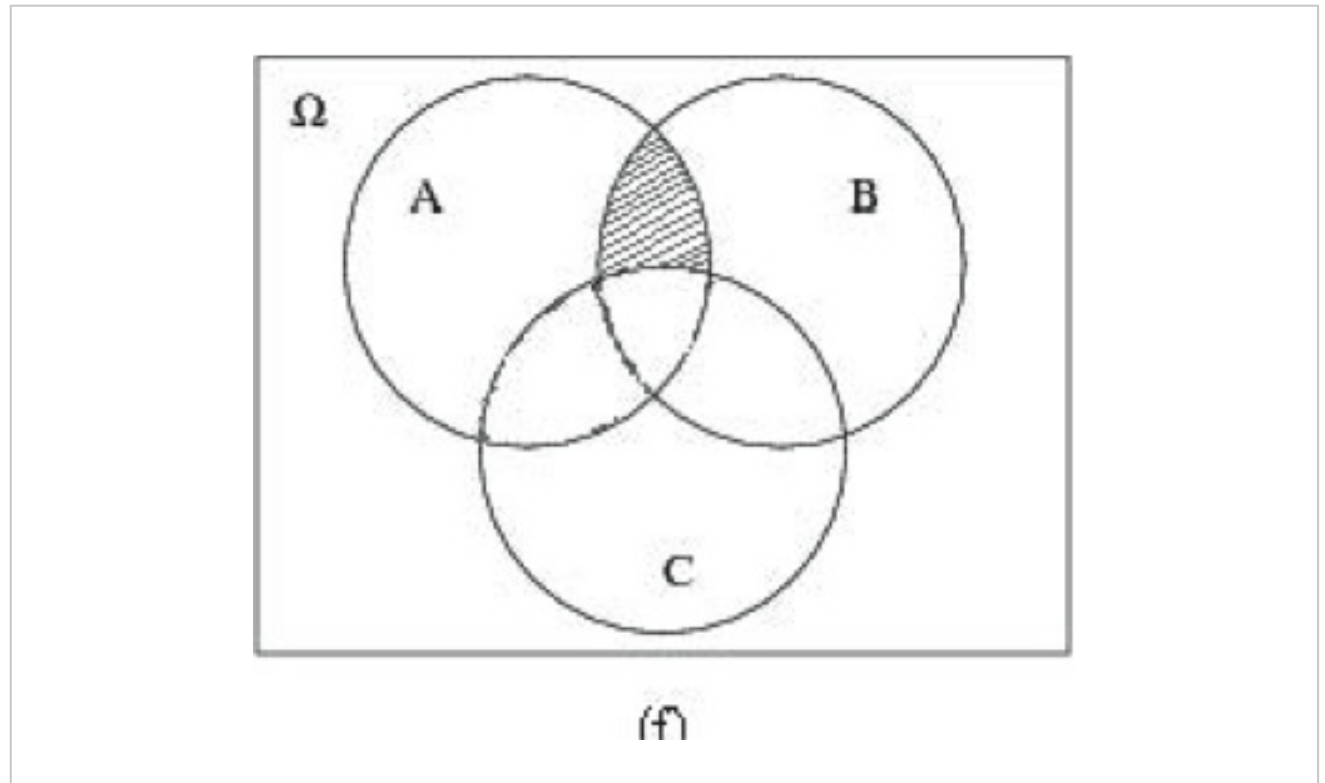


5. Exactly one of the events A, B, C occurs:
 $(A \cap B^c \cap C^c) \cup (A^c \cap B \cap C^c) \cup (A^c \cap B^c \cap C)$

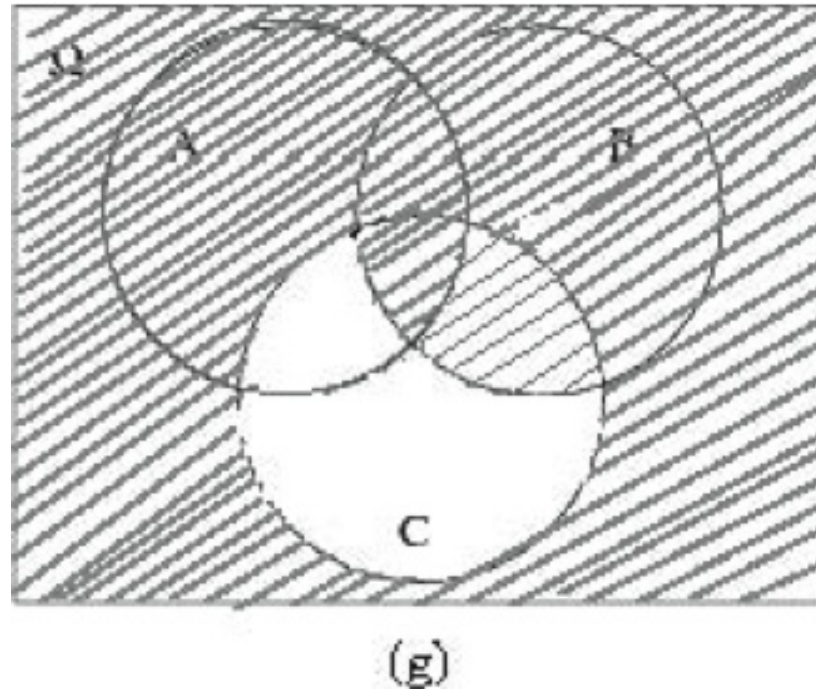


(e)

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



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



You have used 1 of 3 submissions

Printable problem set available here .

DISCUSSION

Click "Show Discussion" below to see discussions on this problem.



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