

MIT OCW: Solutions to courses I find interesting

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1 6.002 – Electronic Circuits

1.1 Problem-Set 1

PROBLEM 1.1.1. Suppose

SOLUTION.

■

1.2 Problem-Set 2

1.3 Problem-Set 3

1.4 Problem-Set 4

1.5 Problem-Set 5

1.6 Problem-Set 6

1.7 Problem-Set 7

1.8 Problem-Set 8

1.9 Problem-Set 9

1.10 Problem-Set 10

1.11 Problem-Set 11

2 6.003 – Signals and Systems

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3 6.004 – Computation Structures

- 3.1 Problem-Set 1**
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4 6.006: Introduction to Algorithms

- 4.1 Problem-Set 1
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- 4.12 Problem-Set 12

5 6.041: Probabilistic Systems Analysis

Because the notation A^c is too ugly to our eyes and we will often be working with set complements we shall set aside the notation \tilde{A} for the complement of A .

5.1 Problem-Set 1

PROBLEM 5.1.1. Express each of the following events in terms of the events A , B , and C as well as the operations of complementation, union, and intersection:

- (a) at least one of the events A , B , C occurs;
- (b) at most one of the events A , B , C occurs;
- (c) none of the events A , B , C occurs;
- (d) exactly one of the events A , B , C occurs;
- (e) events A and B occur, but not C ;
- (f) either event A occurs or, if not, then B also does not occur.

In each case draw the corresponding Venn diagram.

SOLUTION. We present only one of the many possible expressions for (a)-(g) and we shall omit the finer details; suffice it to say, these are all consequences of elementary set theory. We also omit the Venn diagrams the problem is asking us to draw as it would be a bad investment of our time to trace them out using PGF/TikZ.

For part (a): the event, call it E , that at least one of A , B , C occurs is the expression

$$E = A \cup B \cup C.$$

For part (b): the event E that at most one of A , B , C occurs is the expression

$$E = [(A \cap B) \cup (A \cap C) \cup \widetilde{(B \cap C)} \cup (A \cap B \cap C)].$$

For part (c): the event E that none of A , B , C occur is the expression

$$E = \widetilde{A \cup B \cup C}$$

For part (d): the event E that all three events A , B , C occur is the expression

$$E = A \cap B \cap C.$$

For part (e): the event E that exactly one of the events A, B, C occurs is

$$E = (A \cup B \cup C) \setminus [(A \cap B) \cup (A \cap C) \cup (B \cap C) \cup (A \cap B \cap C)].$$

For part (f):

For part (g):

■

PROBLEM 5.1.2.

SOLUTION.

■

PROBLEM 5.1.3.

SOLUTION.

■

PROBLEM 5.1.4.

SOLUTION.

■

PROBLEM 5.1.5.

SOLUTION.

■

PROBLEM 5.1.6.

SOLUTION.

■

PROBLEM 5.1.7.

SOLUTION.

■

- 5.2 Problem-Set 2
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6 18.175 – Differential Analysis I

7 18.156 – Differential Analysis II

8 18.175 – Probability Theory

9 18.440 – Introduction to Probability

Here are solutions to some of the exercises for this class.