MIT OCW: Solutions to courses I find interesting

Carlos Salinas

Last compiled: December 17, 2016

Contents

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

3 6.004 – Computation Structures

4 6.006: Introduction to Algorithms

4.1 Problem-Set 1

4.2 Problem-Set 2

4.3 Problem-Set 3

4.4 Problem-Set 4

4.5 Problem-Set 5

4.6 Problem-Set 6

4.7 Problem-Set 7

4.8 Problem-Set 8

4.9 Problem-Set 9

4.10 Problem-Set 10

4.11 Problem-Set 11

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/Ti*k*Z.

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

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

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. ■

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.