**Math 4428, Sec. 2. MATHEMATICAL MODELING. Spring 2017**

**Homework #4** (due on Wednesday, April 26, at the beginning of class).
50 points are divided between 3 problems. In your solutions, whether or not you are using a computer software, you need to justify each step.

**#1.** (15 points.) Solve Problem 7.5.6 (a,b) on p.243 of the textbook.

**#2.** (15 points.) Solve Problem 7.5.14 (a,b,c) on p.247 of the textbook.

**#3.** (20 points.) Solve Problem 8.5.6 (b,c) on p.292 of the textbook.

**BONUS PROBLEM.** This is a supplementary problem which is beyond the minimum requirements for this class. You are not required to solve it, but if you decide to do it, please enclose the solution together with solutions to HW #4, but **do not staple it together**, because it will be grades separately by the instructor (not grader). You may get **additional credit up to 20 points**, depending on your creativity. This is a certain improvement of the diodes quality control test suggested in Example 7.1, pp. 223–227.

The suggested test consists of 3 stages. As in the textbook, we assume that diodes may be faulty with probability 0.003 each independently.

**I.** Start with a group test for $n = 15$ diodes in the same way as it is suggested in Example 7.1. The cost of this test is $n + 4 = 19$ cents.

**II.** If test I fails, then there is at least one faulty diode out of 15 under consideration. Divide these diodes into 3 subgroups with 5 diodes each, and perform a similar test for each of these subgroups, so that there will be 3 test, and each of them costs $5 + 4 = 9$ cents.

**III.** Finally, perform individual test for each of subgroups for which test II fails. We may have 1, 2, or 3 such subgroups, and the cost of individual testing of each of them is $5 \times 5 = 25$ cents.

Find the average testing cost per diode for the combined test (initial group test, subgroup tests, and individual tests), and compare it with $A = 1.48$ obtained in Example 7.1.