Operations Research

Homework 9

Due on November 16, 2022

Note: Your homework must be submitted via moodle (see the link on the class website) on the due day BEFORE THE TUTORIAL, i.e., before 20:45.

Problem 1 [10 points]

(HL, Exercise 10.3-3.) A college student has 7 days remaining before final examinations begin in her four courses, and she wants to allocate this study time as effectively as possible. She needs at least 1 day on each course, and she likes to concentrate on just one course each day, so she wants to allocate $1, 2, 3$, or 4 days to each course. Having recently taken an OR course, she decides to use dynamic programming to make these allocations to maximize the total grade points to be obtained from the four courses. She estimates that the alternative allocations for each course would yield the number of grade points shown in the following table.

	Estimated Grade Points			
Study Days	**Course 1**	**Course 2**	**Course 3**	**Course 4**
1	1	5	4	4
2	3	6	6	4
3	6	8	7	5
4	8	8	9	8

Solve this problem by dynamic programming.

Problem 2 [10 points]

(HL, Exercise 10.3-10.) Consider the following *integer* nonlinear programming problem.

$$\text{Maximize } Z = 32\,x_1 - 2\,x_1^2 + 30\,x_2 + 20\,x_3$$

subject to

$$3\,x_1 + 7\,x_2 + 5\,x_3 \leq 20$$

and

$$x_1, x_2, x_3 \text{ are nonnegative integers.}$$

Use dynamic programming to solve this problem.