CPSC 4850/5850/7850 – Algorithms in OR
Assignment 4, total 20(30) pts **Due Mar 25**

Instructions: hand in your written or typed answers in class on the due date shown. If you are taking the class as undergraduate, problems marked *(GRAD)* are optional.

Problem 1) **[10 pts]** Write a brief project proposal. Consult the list of proposed topics from the course web page. Clearly identify the optimization problem you wish to solve, specify the method, and explain briefly what you wish to achieve or test.

Problem 2) **[10 pts]** There are 6 students in a class. It is required to form teams of at most 2 students each, so a student can form a team by herself. The cost of grouping student i with j is symmetric and is given in the table below. Find a minimum cost partition of the students in teams using a branch and bound approach. Describe, on paper, the steps taken by B&B. At each subproblem, provide the upper/lower bound considered for that node, the optimal solution for the relaxation, and which variable you decide to branch on. You may use Octave to solve the subproblems (you need not document how you solved the subproblems).

$j=$	1	2	3	4	5	6
$i=1$	16	10	8	58	198	70
2		10	6	72	50	32
3			15	26	198	24
4				15	14	18
5					13	6
6						10

Problem 3) **[10 pts]** (GRAD) Solve the following mixed integer program by branch and bound. Provide the same level of detail, on paper, as for Problem 2.

$$\begin{aligned} \max \quad & 2x_1 + x_2 + 3y_1 + 4y_2 \\ \text{subj. to} \quad & x_1 + 3x_2 - y_1 + 2y_2 \leq 16 \\ & -x_1 + 2x_2 + y_1 + y_2 \leq 4 \\ & x_1, x_2 \in \mathbb{Z}_+,\ y_1, y_2 \geq 0 \end{aligned}$$