PROBLEM SET – MODELING – MULTI-CRITERIA DECISION

PROBLEM 1: FACTORY OF ELECTRONIC PARTS

A company manufactures three types of electronic parts, A, B and C, with a unitary profit of 15, 12 and 10 € per unit respectively. Each component is manufactured in a production line with a capacity of 200 units per week for part A, 300 units per week for part B, and 400 units per week for part C. The company is evaluating the possibility of hiring two robots to increase the production capacity. These robots would be installed in each production line (both robots cannot be installed in the same production line). The first of these robots would cost 1000 €/week, and would increase the capacity of 100 units per week for the corresponding line. The second of these robots would cost 1400 €/week, and would increase the capacity of 150 units per week.

If the company has established as goals to achieve that its profits are greater than 1000 €/week, and its total production greater than 500 units. Formulate a linear programming model which should indicate if the company must hire the robots, how to assign them to each production line, and how many units of each part have to manufacture.

The problem has to be proposed in the most general way, without previous simplifications.

PROBLEM 2: STAFF SELECTION

A company is making a staff selection process to cover one or two jobs (they are sure about hiring one person but whether or not they hire the second one is not clear yet) of computer engineering. The company's objective is to select the candidate or pair of candidates that contributes to the company with a better compromise between his academic record and his ability to work in teams. On the other hand, and given the labor market conditions, the company can only offer hourly contracts, so it must also decide the number of hours of the contract (up to 1800 hours per year).

Until now the company has 6 candidates, for which it knows their academic records *exp*, their ability to work in teams *cap*, and the hourly remuneration demand of each of them *rem*. The total academic record and the total ability to work in teams do not depend on the number of work hours.

Moreover, on the one hand candidate number 5 has said that he/she will only accept the job if contracted for more than 1300 hours. And on the other, candidates' number 2 and 4 mention a confrontation in their earlier company so they could never work together.

a) Formulate the problem of general linear programming that provides the best compromise solution to the company.

b) Assuming that the weights of the ability to work in teams and the academic record are fixed in 0.25 and 0.75 respectively, determine out of all the possible solutions that provide the best compromise (with these weights), the one that minimizes the excess budget regarding the budget limitation. The company counts with a budget of 50.000 € per year, although there is a willingness to go over a bit if the candidate or candidates worth it.