MATH1058: Problem Sheet 1

Problem 1 (Doors and windows)**.** *A glass company manufactures doors and windows. For its completion, each door must be processed for 1 hour in production plant 1 and for 3 hours in production plant 3. For each window, the requirement is of 2 hours in production plant 2 and 2 hours in production plant 3. The unit price of a door is 300 GBP, while that of a window is 500 GBP. Each week, a total of 4 hours of production are available in plant 1, a total of 12 in plant 2, and a total of 18 in plant 3.*

Propose a linear programming formulation for the problem to help the company choose how many doors and windows it should manufacture each week to maximize its profits. Should the variables of the formulation be continuous or restricted to taking integer values?

Problem 2 (Solving an LP graphically)**.** *Solve graphically the following problem:*

$$
\begin{array}{llrcl}
\max & x_1 + 2x_2 & & & \\
\text{s.t.} & -x_1 - 2x_2 & \geq & -2 & (I) \\
& 3x_1 + x_2 & \geq & 0 & (II) \\
& x_1 & \leq & 1 & (III) \\
& x_1 - x_2 & \geq & 0 & (IV) \\
& x_1, x_2 & \geq & 0 &
\end{array}
$$