MATH1058: Problem Sheet 5

Problem 1 (Nurse roster). *After an intense data mining activity, a surgery has determined the minimum amount of nurses it needs in each day of the week: 10 each Monday, 4 each Tuesday, 8 each Wednesday, 5 each Thursday, 11 each Friday, 5 each Saturday, and 4 each Sunday. Propose a linear or integer linear programming formulation for the problem of finding a roster involving the minimum amount of nurses possible, keeping into account that each nurse works for 5 consecutive days, followed by 2 days off.*

Problem 2 (Basic solutions, both feasible and infeasible). *Consider the following linear programming problem:*

$$
\begin{array}{rrrl}
\max & x_1 & +2x_2 & \\
s.t. & -x_1 & -2x_2 & \geq -2 \\
& x_1 & & \leq 1 \\
& x_1 & -x_2 & \geq 0 \\
& x_1, & x_2 & \geq 0
\end{array}
$$

Bring it to standard form and construct all its basic solutions, reporting for each of them the corresponding basis B (and its complement N), which variables are basic and which are nonbasic, and the corresponding basic matrix A_B. Also indicate, for each such basic solution, whether it is feasible or not, and what vertex it corresponds to.