MATH1058: Problem Sheet 2

Problem 1 (Airline fleet). *The personnel of an airline consists of 30 pilots, 24 copilots, 12 navigators, and 132 flight assistants. The airline's fleet features 19 Boeing 717, each with a capacity of 180 passengers, and 14 Boeing 787, each with a capacity of 340 passengers. Each 717 needs 1 pilot, 1 copilot, and 4 flight assistants. The requirements of a 787 are 1 pilot, 1 copilot, 1 navigator, and 7 flight assistants.*

- *Propose a linear programming formulation for the problem of finding the maximum number of passengers that the airline can carry. Should the variables of the formulation be continuous or restricted to integer values?*

- *Extend the model to account for the fact that, if necessary, a pilot can act as a copilot (but not* vice versa*).*

Problem 2 (Vertex solutions). *Convert the following linear programming problem to standard form:*

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

Convert it no to simplified canonical form, indicate which constraints are tight at its vertex solutions, and compute the value of such solutions.