1. Give the following linear program in the standard form:

\[
\begin{align*}
    \text{max} & \quad 2x_1 - 3x_2 + x_3 \\
    \text{s.t.} & \quad x_1 + x_2 \geq 2x_3 \\
                 & \quad 3x_2 - 4x_3 \leq x_1 \\
                 & \quad x_1 \geq 0 \\
                 & \quad x_2 \geq 0
\end{align*}
\]

2. Express the condition “if \( y = 0 \), then \( x_1 + \cdots + x_n \leq 100 \)” as a linear constraint, where \( y \) is an integer variable such that \( 0 \leq y \leq 1 \) and \( 0 \leq x_i \leq 1000 \). Hint: employ a sufficiently large constant \( M \).

3. Represent the constraints

\[
\begin{align*}
    \frac{x}{x-y} & \leq 2 \\
    2x - y & \leq -1 \\
    x & \geq 0 \\
    y & \geq 0
\end{align*}
\]

using purely linear constraints.

4. Represent the following constraints as linear constraints.
   (i) \( |a_1x_1 + \cdots + a_n x_n| = 0 \).
   (ii) \( |a_1x_1 + \cdots + a_n x_n| \leq b \).

5. Represent the constraint \( |x| \geq b \) as linear constraints where \( x \) is unrestricted in sign. Hint: employ an additional binary integer variable and a sufficiently large constant \( M \).