1. Find the indefinite integral $\int e^{2x} x^2 \, dx$;

2. Solve the differential equation
$$y'' - y' - 6y = -6x - 1.$$

3. Solve the difference equation
$$y_{t+2} - 8y_{t+1} + 16y_t = 5t.$$

4. Solve the linear programming problem for non-negative x_i:
$$\begin{cases} 2x_1 + 2x_2 + 3x_3 \to \min \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \\ 3x_1 + 5x_2 + x_3 \geq 8 \\ 5x_1 + 3x_2 + x_3 \geq 9 \end{cases}.$$

5. Maximize the function
$$11 + 10x_1 - x_1^2 - 3x_2 + 8x_3 - x_3^2$$
subject to constraints $2x_1 - x_2 + 4x_3 \leq 10$ and $x_2 \leq 100$.