1. Verify that \( \{x^{1/2}, x^{-3/2}\} \) is a fundamental set of solutions for
\[
4x^2 y'' + 8xy' - 3y = 0.
\]
2. Use the method of Reduction of Order to find the general solution for

$$(1 + x^2)y'' + 2xy' = 0$$

where $y_1 = 1$ is a given solution.
3. Find the general solution of the equation
\[2y''' - 5y'' + 22y' - 10y = 0.\]
4. Find an annihilator of the function

\[ f(x) = x(x + \cos^2 x) - 4e^{3x}. \]