MATHEMATICAL ANALYSIS 2
Test 3, version B.

1. Using the Laplace transform, solve the Cauchy problem

$$\begin{cases} x' = -x + 2y \\ y' = -2x - y \end{cases}, \quad x(0) = 1, \quad y(0) = 1.$$

2. Find the general solution to the difference equation

$$x_{n+3} = x_{n+2} - 2x_{n+1} - 4x_n, \quad n \geqslant 0.$$

3. Determine the Taylor series for the function $f(x) = xe^x$ at the point $x = 3$. Find the radius and the interval of convergence of the series.