

DIFFERENTIAL AND DIFFERENCE EQUATIONS. FINAL EXAM FEB 1, 2023

NAME AND SURNAME

CHOOSE FIVE PROBLEMS OUT OF THE FOLLOWING SIX.

1. Solve

$$\begin{cases} xy'(x) - 2y(x) = 2x^4 \\ y(1) = 3. \end{cases}$$

2. Find a Bernoulli equation $y'(x) + a(x)y(x) = b(x)(y(x))^n$ whose general solution is

$$y(x) = \sqrt[3]{Cx^2 + x^4}$$

3. Solve the equation

$$(y^2 - 5x^4y)dx + (4xy - 3x^5)dy = 0$$

4. Find the general solution of

$$y''(x) + 3y'(x) + 2y(x) = \sin(e^x).$$

5. Find the special solution of

$$y''(x) + 3y'(x) + 2y(x) = e^{-x}$$

satisfying the conditions $y(0) = 2, y'(0) = -2$ without using the Laplace transformation method.

6. Find the special solution of

$$y''(x) + 3y'(x) + 2y(x) = e^{-x}$$

satisfying the conditions $y(0) = 2, y'(0) = -2$ using the Laplace transformation method.