

Instructor: Leopoldo P. Franca

NAME: _____

FINAL:

Please show all your work in the test. Gussed answers are NOT acceptable. Open book. You may use calculators. Good luck!

(25 pt) 1) Solve:

$$\frac{dy}{dx} = \frac{10 - 2x}{y^3 - y - 6}, \quad y(2) = -1.$$

(25 pt) 2) Solve:

$$(x^2 + 1) \frac{dy}{dx} + 3xy = 6x.$$

(25 pt) 3) Give the general solutions of:

a) $2y'' - 7y' + 3y = 0$

b) $y^{(4)} + 3y^{(3)} + 3y'' + y' = 0$

(25 pt) 4) Find the solution of

$$y'' + 4y = 3x^3$$

(25 pt) 5) Find the general solution of

$$y'' - 2y' + y = e^x \ln x, \quad x > 0$$

(25 pt) 6) Solve using the Laplace transform technique

$$y' + y = u(t - 2)$$

$$y(0) = 1$$

(25 pt) 7) Find the first four nonzero terms of a power solution about $x = 0$ for

$$(4 - x^2)y' + y = 0$$

(25 pt) 8) Solve the system of differential equations

$$x' - 4x + 3y = 0$$

$$-6x + y' + 7y = 0$$