

Instructor: Leopoldo P. Franca

NAME: _____

TEST # 2:

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

(10 pt) 1) Compute the Wronskian of $\{1, x, \cos x\}$ and decide if these functions are linearly independent on $(0, 1)$.

(40 pt) 2) Give the general solutions of these linear homogeneous differential equations:

1) $y'' - 4y = 0$

2) $y'''' - 81y = 0$

3) $(D - 1)(D - 2)(D - 2)(D - 2)(D + 2)y = 0$

4) $(D + 4)^2 y = 0$

(10 pt) 3) Give the general solution to $y'' + 2y' + 2y = 0$, and the solution for which $y(0) = 0$ and $y'(0) = 1$.

(10 pt) 4) Find the general solution of $y'' - 6y' + 9y = e^{3x}$, using the method of undetermined coefficients.

(15 pt) 5) Solve by variation of parameters the inhomogeneous equation

$$(D - 1)(D + 2)y = \frac{1}{e^x + 1}$$

(15 pt) 6) A mass M hangs from a perfect spring with constant K in a uniform gravitational field with constant G . Write the equation of motion for this system, and determine the angular frequency. Assume that the displacement is $x(t)$, with $x(0) = 5$, $x'(0) = 0$, and $M = 8$, $G = 32$, $K = 16$. Find the solution fitting these initial conditions.