King Fahd University of Petroleum and Minerals

Department of Mathematics and Statistics

Math 260 (Term 112)

Test N° 1

(To be submitted by May 9, 2012)

ID:

Name:

Exercise 1.

Consider the initial value problem

$$y'' - \frac{1}{t}y' - \frac{3}{t^2}y = 0,\ y(1) = 4,\ y'(1) = 8,\ 0 < t < \infty.$$

(a) Show that $y_1(t) = t^3$ and $y_2(t) = t^{-1}$ are solutions to the differential equation.
(b) Show that $\{y_1, y_2\}$ is a fundamental set of solutions to the differential equation.
(c) Solve the given initial value problem.

Exercise 2.

Solve: $y'' - 5y' - 6y = 0.$

Exercise 3.

Solve the initial value problem

$$y'' - 10y' + 29y = 0,\ y(0) = 1,\ y'(0) = 3.$$

Exercise 4.

Find a homogeneous linear ordinary differential equation whose general solution is $y(t) = c_1 e^{2t} \cos(3t) + c_2 e^{2t} \sin(3t)$.

For exercises 5-6-7, use the method of Undermined Coefficients to find a particular solution and solve the given DE.

Exercise 5.

Find the general solution of the nonhomogeneous equation

$$y'' - 2y' - 3y = 36e^{5t}.$$

Exercise 6.

Find the general solution of

$$y'' - y' + y = 2\sin 3t.$$

Exercise 7.

Find the general solution of

$$y'' + 4y' - 2y = 2t^2 - 3t + 6.$$

For Exercises 8-9, use the method of Variation of Parameters to solve the given DE.

Exercise 8.

Find the general solution of

$$y'' - y' - 2y = 2e^{-t}$$

using the method of variation of parameters.

Exercise 9.

Find the general solution to $(2t-1)y'' - 4ty' + 4y = (2t-1)^2 e^{-t}$ if $y_1(t) = t$ and $y_2(t) = e^{2t}$ form a fundamental set of solutions to the equation.