# 1St Midterm Exam – Math 225

Fall 2013 –

Exercise 1:

State the order of the given equations. Determine whether the equation is linear or nonlinear.

1. $\left(1+x\right)y^{''}+ 4xy^{'}+5y=\sin(x)$
2. $ t^{6}y^{(3)}-t^{3} y^{''}+(y^{'})^{2}+6ty=0$

Exercise 2:

Verify that the function: $y(x) =e^{3x}cos2x $is an explicit solution of the differentiable equation:

$$y^{''}- 6y^{'}+13y=0$$

Assume an appropriate internal ***J*** of definition of$ y$.

Exercise 3:

1. Verify that $y\left(x\right)=c\_{\begin{array}{c}1\\ \end{array}}e^{x}+ c\_{\begin{array}{c}2\\ \end{array}}e^{-x}$ is a two-parameter family of solutions of (E) $y^{''}-y=0$
2. $Find a solution of I.V.P\left\{\begin{matrix} y^{''}-y=0\\y\left(0\right)=1\\y^{'}\left(0\right)=2\end{matrix}\right. $

Exercise 4:

Solve the given (Separable) equation:

$$y^{'}=y(2-y)$$

Exercise 5:

Find an explicit solution of $I.V.P\left\{\begin{matrix} y^{'}=1+y^{2}\\y\left(\frac{π}{4}\right)=1\\\end{matrix}\right.$