King Fahd University Of Petroleum and Minerals
College of Sciences
Mathematics and Statistics Department
Math 202-03
Quiz#1

Name:..... ID#:..... Serial#:.....

1. State the order of the ordinary differential equation $x\frac{d^3y}{dx^3} - \left(\frac{dy}{dx}\right)^4 + y = 0$. Determine whether the equation is linear or nonlinear and give a reason.

2. Solve the following differential equation $\frac{dy}{dx} + y = f(x)$, $y(0) = 0$ where $f(x) = \begin{cases} 1, & 0 \le x \le 1 \\ 0, & x > 1 \end{cases}$

3. Verify that $y = e^{-x^2} \int_0^x e^{t^2} dt + ce^{-x^2}$ is a one parameter family of solutions of $2y' + 4xy = 2$.

4. Find values of m so that the function $y = e^{mx}$ is a solution of $2y'' + 7y' - 4y = 0$

5. Given that $y = \frac{1}{x^2+c}$ is a one parameter family of a first order differential equation. Find a solution of the first order Initial Value Problem which has the differential equation and the condition $y(-2) = \frac{1}{2}$. Then give the largest interval I over which the solution is defined.

6. Determine whether the theorem of existence and uniqueness will guarantee that the differential equation $y' = \sqrt{y-1}$ possesses a unique solution through the point $(-1, 1)$. What about through the point $(1, -1)$?.

7. Solve the following differential equations:

   (a) $\frac{dy}{dx} = \frac{xy+2y-x-2}{xy-3y+x-3}$

   (b) $x\frac{dy}{dx} + 4y = x^3 - x$