King Fahd University Of Petroleum and Minerals
College of Sciences
Mathematics and Statistics Department
Math 202-12
Quiz#1

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

1. State the order of the ordinary differential equation $\frac{d^2u}{dr^2}+\left(\frac{du}{dr}\right)^3+u=\cos r$. Determine whether the equation is linear or nonlinear and give a reason.

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

3. Verify that $\ln\left(\frac{2x-1}{x-1}\right) = t$ is a one parameter family of solutions of $\frac{dx}{dt} = (x-1)(1-2x)$.

4. Find values of m so that the function $y = e^{mx}$ is a solution of $y''-5y'+6y = 0$

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 $y(2) = \frac{1}{3}$. Then give the largest interval I over which the solution is defined.

6. Determine a region of the $x - y$ plane for which the differential equation $\frac{dy}{dx} = \sqrt{xy}$ would have a unique solution whose graph passes through a point (x_0, y_0) in the region.

7. Solve the following differential equations:

(a) $(e^x + e^{-x})\,\frac{dy}{dx} = y^2$

(b) $(x+2)^2\,\frac{dy}{dx} = 5 - 8y - 4xy$