Name KEY

Math 255, Quiz #1, Summer 2012

Instructions: Show all work. You may use a calculator to check your answers, but all work must be shown for full credit.

1. Classify the following differential equations by order, ordinary or partial, and linear or nonlinear.
   a. $\ddot{y} + x^2\dot{y} + 5xy = \sin(x)$

Ordinary, linear, order 2

   b. $\frac{\partial^2 u}{\partial x \partial y} + \left(\frac{\partial u}{\partial x}\right)u = 0$

partial, nonlinear, order 2

2. Find a solution to the initial value problem $y'' + y = 0$ given that the general solution $y = Acos(x) + Bsin(x)$ subject to the initial conditions $y\left(\frac{\pi}{2}\right) = 0, y'\left(\frac{\pi}{2}\right) = 1$.

$0 = A\cos\pi/2 + B\underset{=1}{\sin}\pi/2$

$B = 0$

$y' = -A\sin x + B\cos x$

$1 = -A\underset{=1}{\sin(\pi/2)}$

$1 = -A$

$A = -1$

$\boxed{y = -\cos x}$