Mathematics 3113-005 Name (please print) ____________________

Quiz 2 Form B

February 11, 2011

Instructions: Give concise answers, but clearly indicate your reasoning.

I. (3) For the first-order linear homogeneous DE $y' + P(x)y = 0$, verify that if y_1 and y_2 are solutions, then so is $Ay_1 + By_2$ for any constants A and B.

II. (3) Check whether the initial value problem $\dfrac{dy}{dx} = y^{2/3}$, $y(2) = 0$ satisfies the hypotheses of the Existence and Uniqueness Theorem. What does the theorem tell you about the solutions of this IVP?

III. (5) For the linear DE $xy' = 2y + x^3\cos(x)$, find an integrating factor, then carry out the recipe to find the general solution. (Hint: If you find yourself needing integration by parts, you have made a computational error along the way. Don't burn time on the calculation until you have the correct integrating factor and have done the algebra correctly.)

IV. (4) Rewrite the DE $(x + 2y)\,y' = y$ as a homogeneous DE, and carry out the substitution $v = \dfrac{y}{x}$ to transform the equation into a DE of the form $v' = F(v, x)$. Simplify and tell what method you would use to solve this DE, but *do not* carry out the method or proceed beyond this point.