

Quiz 2 Form A

February 11, 2011

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

- I.** Check whether the initial value problem $\frac{dy}{dx} = y^{1/3}$, $y(3) = 0$ satisfies the hypotheses of the Existence and Uniqueness Theorem. What does the theorem tell you about the solutions of this IVP?
(3)
- II.** 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 .
(3)
- III.** 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.)
(5)
- IV.** Rewrite the DE $(4x - y)y' = y$ as a homogeneous DE, and carry out the substitution $v = \frac{y}{x}$ 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.
(4)