MAT 2680 Differential Equations Quiz 4 Fall 2013 Halleck

A(n) __**differential**__equation of the form $\frac{dy}{dx} = f(x,y)$ is of order __**one**__ . It may be linear or may be __**nonlinear**__. If it can be written in the form $M(x)dx + N(y)dy = 0$, then it is said to be __**separable**____.

For $\frac{dy}{dx} = \frac{3x^2+4x+2}{2(y-1)}$, $y^2 - 2y - (x^3+2x^2+2x+C) = 0$ is a(n) __**implicit**__ solution. If we solve for *y*, we get 2 possible solutions $y = 1 \pm \sqrt{x^3+2x^2+2x+C}$, each of which is a(n) __**explicit**__ solution. Given the initial condition $y(0) = 0$, we choose C=___**1**_____ and the upper/**lower** (choose one) branch to get the solution $\underline{y = 1 - \sqrt{x^3+2x^2+2x+1}}$. Given the initial condition $y(0) = 2$, we choose C=___**1**_____ and the opposite branch to get the solution $\underline{y = 1 + \sqrt{x^3+2x^2+2x+1}}$. The domain of either of these functions is ___**(−1,∞)**_____. *Work for last question*: $x^3+2x^2+2x+1 = (x+1)(x^2+x+1)$**, the disc of the 2nd factor is** $(1)^2 - 4(1)(1) = -3 < 0$**. Hence −1 is the only root and since the leading coefficient is positive, [−1,∞) is where the radicand is non-negative. We exclude the endpoint due to the vertical tangent line.**