

HONOR 2201, CALCULUS FOR NON-SCIENCE MAJORS, QUIZ 8, 11/11/05

Name: Solution

Student ID #: _____

1. (5 pts) Decide whether or not $y = x^3$ is a solution to the differential equation $xy' - 2y = 0$.
(Justify your answer.)

$$\text{LHS} = xy' - 2y = x(3x^2) - 2(x^3) = 3x^3 - 2x^3 = \boxed{x^3}$$

$$\text{RHS} = \boxed{0}$$

$$\Rightarrow \text{LHS} \neq \text{RHS}$$

So $y = x^3$ is not a solution to $xy' - 2y = 0$.

2. (6 pts) Find the value(s) of the constant k for which $y = x^2 + k$ is a solution to the differential equation $2y - xy' = 2$.

$$y = x^2 + k \quad \& \quad y' = 2x$$

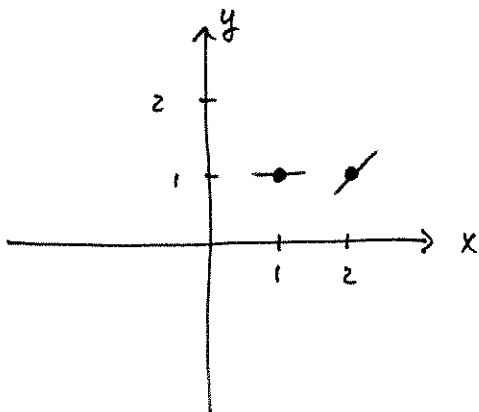
$$\text{So } 2y - xy' = 2 \Leftrightarrow 2(x^2 + k) - x(2x) = 2$$

$$\Leftrightarrow \cancel{2x^2} + 2k - \cancel{2x^2} = 2$$

$$\Leftrightarrow 2k = 2$$

$$\Leftrightarrow \boxed{k = 1}$$

3. (4 pts) Find the slopes and draw the slope field by little line segments at the given two points (1, 1) and (2, 1) below for the differential equation $y' = x - y$.



$$\text{slope at } (1, 1) = 1 - 1 = 0$$

$$\text{slope at } (2, 1) = 2 - 1 = 1$$