Homework 2

Due February 19, 2014

(1) Find a solution to the differential equation $\frac{dy}{dx} = \frac{1}{2}(x^2 - 1)$ that satisfies $y(0) = 2$.

(2) Use implicit differentiation to find the equation of the tangent line to the curve $y^2(y^2 - 4) = x^2(x^2 - 5)$ at the point $(0, -2)$. (This curve is actually called the "Devil's Curve." But don't let that intimidate you!)

(3) Assume you have a perfectly spherical snowball that is melting. If the surface area of the snowball is decreasing at a rate of 1 cm^2/min, find the rate at which the diameter decreases when the diameter is 10 cm.

(4) Use Euler's Method to find $y(6)$ given the differential equation $\frac{dy}{dx} = 2x - 3y$ starting at the point $(4, 3)$ with step size $\Delta x = 0.5$. Use the table below to show each step.

x	y	$\frac{dy}{dx}$	Δy