Examination 2 - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Wednesday, October 31, 2012

Please work without books, notes, calculators, or any assistance from others. If you have any questions, feel free to ask me. Please do your work on separate paper; you should staple this sheet to your work (put this on top) and turn in everything together.

The first five questions are 16 points each and the last is 20 points.

(1) Find $\frac{dy}{dx}$ if $y = \frac{x}{4-\tan x}$.

(2) Find $\frac{dy}{dx}$ if $\sin(xy) = x^2 - \ln(y)$.

(3) If a ball is given a push so that it has an initial velocity of 5 m/s down a certain inclined plane, then the distance it has rolled after t seconds is $s = 5t + 3t^2$.

   (a) Find the velocity after 2 s.

   (b) How long does it take for the velocity to reach 35 m/s?

(4) A plane flying horizontally at an altitude of 1 mi and a speed of 500 mi/h passes directly over a radar station. Find the rate at which the distance from the plane to the station is increasing when it is 2 mi away from the station.

(5) Find the absolute maximum and minimum values of $y = e^x - x$ on $[-1, 1]$.

(6) Graph the function $y = \frac{x}{2} - \sin(x)$ for $0 < x < 2\pi$. Indicate where your graph is increasing or decreasing, and where it is concave up and down. Indicate all the critical points and points of inflection.