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) Compute $\frac{df}{dx}$ for $f(x) = \tan(x)$ and for $f(x) = \csc(x)$.

(2) Find $\frac{dy}{dx}$ if $y = \ln(7 + 2x^5)$.

(3) Explain the meaning and the origin of the equation $y(t) = y(0)e^{kt}$ in modeling situations such as population growth, compound interest, radioactive decay, etc. When is k positive, and when is it negative?

(4) If a snowball melts so that its surface area decreases at a rate of $1 \ cm^2/min$, find the rate at which the diameter decreases when the diameter is $10 \ cm$.

   (Recall that the surface area of a sphere of radius r is $4\pi r^2$.)

(5) Find the absolute maximum and minimum values of $\frac{x}{x^2+1}$ on $[0, 2]$.

(6) Graph the function $y = 2 + 2x^2 - x^4$. 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.