Makeup Examination 3 - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Friday, November 18, 2011

Please work without books, notes, calculators, or any assistance from others. If you have any questions, feel free to ask me.

(1) Verify that $f(x) = \frac{x}{x+2}$ satisfies the conclusion of the Mean Value Theorem on the interval $[1, 4]$, and find all numbers c which satisfy the conclusion of the Mean Value Theorem.

(2) Sketch the graph of $f(x) = \frac{1}{x^2-9}$. In addition, find the intervals of increase and decrease, the local maximum and minimum values, the intervals of concavity, and the inflection points.

(3) The graph of the derivative f' of a continuous function f is shown. Sketch a graph of f between $x = 0$ and $x = 4$, given that $f(0) = 0$. Label any local maxima or minima and inflection points. (You may ignore the part of the curve with $x > 4$.)

(4) Find two numbers whose difference is 10 and whose product is a minimum.

(5) Two cars start moving from the same point. One travels south at 60 mi/h and the other travels west at 25 mi/h. At what rate is the distance between the cars increasing two hours later?

(6) Evaluate $\int_{-2}^{0} 3x\,dx$ using geometry.

(7) Evaluate

$$\int e^{\cos t} \sin t\,dt.$$