

Practice 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 the function $f(x) = 5 - 12x + 3x^2$ satisfies the hypotheses of Rolle's Theorem on the interval $[1, 3]$. Then, find all numbers c that satisfy the conclusion of Rolle's theorem.
- (2) Sketch the graph of the function $h(x) = x^5 - x$. In addition, find the intervals of increase or decrease, find the local maximum and minimum values, and find where the graph is concave up and concave down.
- (3) Given the graph on Stewart, p. 345, Problem 51, sketch an antiderivative F , given that $F(0) = 1$.
- (4) A farmer wants to fence an area of 15,000 square feet in a rectangular field and then divide it in half with a fence parallel to one of the sides of the rectangle. How can he do this so as to minimize the total length of the fence?
- (5) A boat is pulled into a dock by a rope attached to the bow of the boat, passing through a pulley on the dock that is 1 m higher than the bow of the boat. If the rope is pulled in at a rate of 1 m/s, how fast is the boat approaching the dock when it is 8 m from the dock?

- (6) What is wrong with this?

$$\int_{-2}^1 x^{-4} dx = \left. \frac{x^{-3}}{-3} \right|_{-2}^1 = -\frac{3}{8}.$$

- (7) Evaluate

$$\int_1^2 \frac{4 + u^2}{u^3} du.$$