

Examination 1 - Math 142, Frank Thorne (thorne@math.sc.edu)

Thursday, September 26, 2013

Instructions and Advice:

- There are seven questions. Each of them is essentially the same as one of the ‘required’ or ‘additional’ problems from your homework, sometimes with minor changes.
- There is one question from each of Sections 5.5, 6.1, 7.1, 7.3, 7.4, 7.5, and 7.8, with one exception. They appear in random order; it is up to you to determine the integration strategy for each integral.
- You are welcome to as much scratch paper as you need. Turn in everything you want graded, and throw away everything you do not want graded.
- **Draw pictures where appropriate.** For the area problem, graph the area to be computed and draw a typical slice. If you do a trigonometric substitution, draw a triangle that represents the substitution you make. For definite integrals, it is recommended (but not required) that you draw a graph representing the value of the definite integral, to allow you to check your work.
- Be clear, write neatly, explain what you are doing, and show your work. **This is especially important for earning partial credit** in case your work contains one or more mistake. Be warned that **work I cannot understand will not receive any credit.**
- 75 minutes is a long time. Don’t dilly-dally, but don’t rush. **You are strongly advised to take the entire 75 minutes to complete the examination.** If you finish early, you have the opportunity to check your work.
- Please work without books, notes, calculators, or any assistance from others.
- I will be at the front of the room; if you have any questions, feel free to ask me.

GOOD LUCK!

(1) Evaluate

$$\int \frac{x^2 + 2x - 1}{x^3 - x} dx.$$

(2) Find the area bounded by the graphs of $y = x^2$ and $y = 12x - x^2$.

As part of your solution, draw both graphs and the area to be computed, and draw a typical slice which represents what you are integrating.

(3) Evaluate

$$\int_1^\infty e^{-y/3} dy.$$

(4) Evaluate

$$\int_1^3 \frac{3t}{(t+1)^2} dt.$$

(5) Evaluate

$$\int \frac{\sqrt{t^2 - 1}}{t} dt.$$

(6) Evaluate

$$\int_1^e (\ln x)^2 dx.$$