Math 125 G - Winter 2009 Mid-Term Exam Number One January 29, 2009

Name:			
Student ID number:	Section:		

1	20	
2	10	
3	10	
4	10	
5	10	
6	10	
Total	70	

- Complete all questions.
- You may use a scientific calculator during this examination; graphing calculators and other electronic devices are not allowed and should be turned off for the duration of the exam.
- If you use trial-and-error, a guess-and-check method, or numerical approximation when an exact method is available, you will not receive full credit.
- You may use one double-sided, hand-written, 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 80 minutes to complete the exam.

1. Evaluate the following integrals.

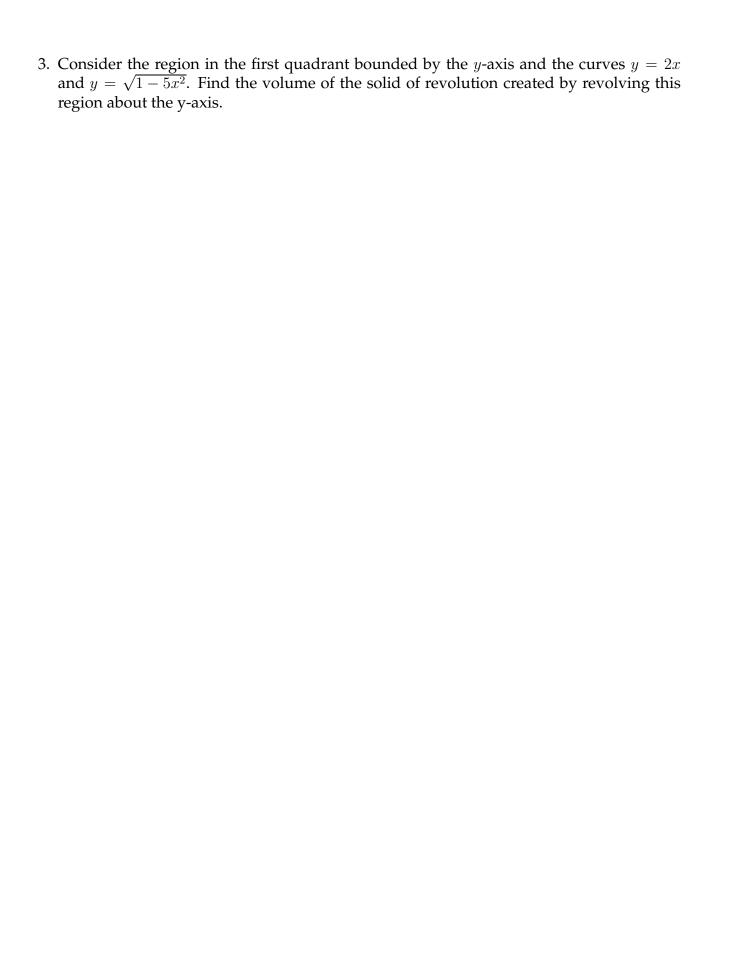
(a)
$$\int \frac{\ln x}{x} \, dx$$

(b)
$$\int_0^3 \sqrt{36-4x^2} \, dx$$

(c)
$$\int x^9 \sqrt{x^5 + 3} \, dx$$

(d)
$$\int \frac{x+4}{x^2+1} \, dx$$





4. Give upper and lower bounds for the sum

$$\sum_{i=1}^{n} \frac{1}{i^2 + 1}$$

5. For m > 0, consider the region bounded by the curve $y = x^2$ and the lines y = mx and y = 2mx. Find m so that this region has an area of 252.

6. Suppose a region in the plane is bounded by y = f(x), y = g(x), x = a and x = b, with 0 < g(x) < f(x) and a < b. Show that the volume of the solid of revolution created by revolving this region about the line y = -k (for k > 0) is a linear function of k (i.e., a function of the form Ak + B).