Math 221 Calculus
Midterm Three
Instructor: Alexander Kiselev

No calculator allowed.
Write detailed work to obtain full credits.

Your Name:

Please circle your TA's name:

Michael Childers	Asher Langton	Seth Meyer	Xu Yang

Problem/pt	Score
P1/15	
P2/20	
P3/15	
P4/10	
P5/15	
P6/15	
P7/10	
Total/100	

Math 221, Fall 2006, Lecture 7, Midterm 3.

Try to do first the problems that look simplest to you. You don't have to follow the order. Avoid spending too much time on one question with others not done yet. Good luck!

1. Compute

a. (5) The indefinite integral $\int \cos(\sqrt{x^2+1})\frac{x}{\sqrt{x^2+1}}\,dx$

b. (10) The indefinite integral $\int \log(1+(\sin x)^2)\sin 2x\,dx$.

2. (20) Sketch the graph of a function $f(x) = x^3 + 18x^2 + 105x - 21$. To generate the sketch, find critical points, classify local extrema, inflection points, intervals of increase, decrease and up/down concavity. How many roots (zeroes) does f have? Justify your answer.

4. (10) State L'Hopitale's rule. Compute $\lim_{x\to 0} \frac{e^{-x^2}-\cos x}{x^2}$.

5. (15) State and prove the Fundamental Theorem of Calculus (both parts). You may use without proof other properties and theorems presented in lectures, but you should always indicate very clearly what is it that you are using.

6. (15) Describe what is called a partition of $[a, b]$ and what is a Riemannian sum corresponding to this partition. Consider the function $f(x) = \frac{1}{1+(\sin x)^4}$. Compute the upper and lower Riemannian sum for this function on interval $[0, \pi]$ using the partition $P = \{0, \pi/3, 2\pi/3, \pi\}$.

7. (10) Compute the area bounded by the curves $y = \sin x$, $y = -x + \frac{\pi}{2} + 1$, and $y = 0$.