

Midterm Exam 2, Friday, March 30, 2007
Lev Borisov, Math 221, Lecture Section 1

**DO NOT OPEN THE EXAM
BEFORE THE START
ANNOUNCEMENT !**

Please write your name and your TA's name below.

Name:

TA:

Each problem is worth 20 points, for a total of 100 points. **Calculators are not allowed on this test.** Please read each question carefully, it also helps to check afterwards that you have answered each part of each question. **You must show all your work to receive credit.** When you turn in your paper after the test, make sure the TA checks your name in their list or writes your name down. Good luck!

1	2	3	4	5	Total

[1] Calculate derivative of

$$f(x) = \frac{\sqrt{x^2 + x \cos(\sqrt{x})}}{\sin x}$$

You do not need to simplify.

[1] (20 pts)

Please leave blank!

[2] Find the tangent line to the curve

$$y \cos x + x \sin y = x - \pi$$

at the point $(\pi, 0)$.

[2] (20 pts)

Please leave blank!

[3] A function $f(x)$ is even and has derivative $f'(x) = \frac{x}{x^2+1}$. Find the critical points of $f(x)$ and its intervals of increase and decrease. Find inflection points and regions of concavity. State which critical points are local minimums or maximums. Finally, sketch the graph of $f(x)$, assuming that $f(0) = 1$.

[3] (20 pts)

Please leave blank!

[4] Calculate the following limit

$$\lim_{t \rightarrow 0} \frac{\cos\left(\frac{\pi}{2} \cos t\right)}{\sin(\sin t)}$$

[4] (20 pts)

Please leave blank!

[5] Find the value of x for which the sum

$$\sum_{k=1}^{20} (x+k)^2$$

is minimum or show that no such x exists. You must justify your answer.

[5] (20 pts)

Please leave blank!