

Name:

SOLUTIONS

Math 1a Midterm Examination I—Wednesday, October 26, 2005

Please circle your section:

Bret Benesh    Tatyana Chmutova    Maksym Fedorchuk    Thomas Judson  
MWF 9–10      10–11 MWF            10–11 MWF            11–12 MWF

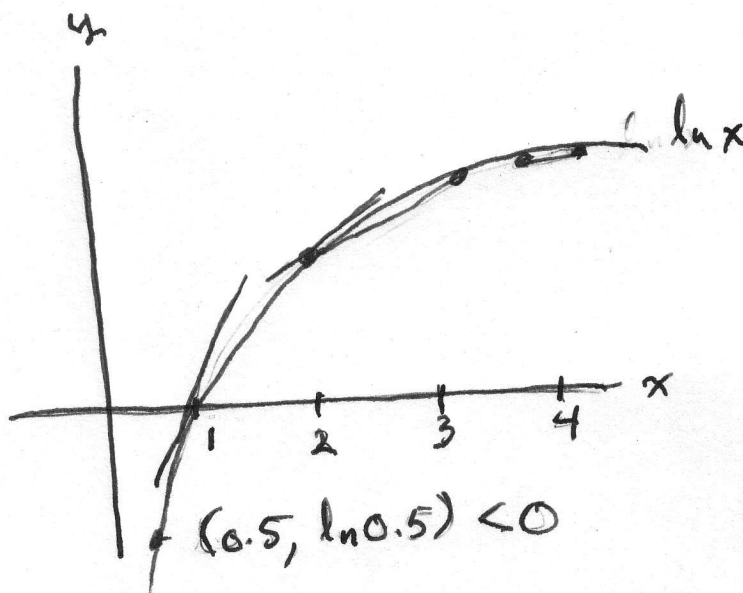
Tatyana Chmutova    Robin Gottlieb    Robin Gottlieb  
MWF 12–1            TTh 10–11:30    TTh 11:30–1

Problem Number	Possible Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
Total	100	

**Directions—Please Read Carefully!** You have two hours to take this midterm. Make sure to use correct mathematical notation. Pace yourself by keeping track of how many problems you have left to go and how much time remains. You do not have to answer the problems in any particular order, so move to another problem if you find you are stuck or spending too much time on a single problem. To receive full credit on a problem, you will need to justify your answers carefully—unsubstantiated answers will receive little or no credit (except if the directions for that question specifically say no justification is necessary, such as in a True/False section). Please be sure to write neatly—illegible answers will receive little or no credit. If more space is needed, use the back of the previous page to continue your work. Be sure to make a note of this on the problem page so that the grader knows where to find your answers. *Calculators are not allowed.* **Good Luck!!!**

1. (10 points) Let  $f(x) = \ln x$ . By interpreting some of the following expressions as slopes of secant and tangent lines, list the following expressions in *ascending order* (from smallest number to largest).

- (a)  $f'(1)$
- (b)  $f'(2)$
- (c)  $\ln 3 - \ln 2$
- (d) 0
- (e)  $\ln 0.5$
- (f)  $\frac{\ln 4 - \ln 3.5}{0.5}$



$$\ln(0.5) < 0$$

$\frac{\ln 4 - \ln 3.5}{0.5}$  is the slope of a secant line

through the points  $(3.5, \ln 3.5)$  and  $(4, \ln 4)$

$\ln 3 - \ln 2$  is the slope of a secant line through the points  $(2, \ln 2)$  and  $(3, \ln 3)$

$f'(2)$  is the slope of a tangent line at  $(2, \ln 2)$

$f'(1)$  is the slope of a tangent line at  $(1, f(1))$

$$\ln(0.5) < 0 < \frac{\ln 4 - \ln 3.5}{0.5} < \ln 3 - \ln 2 < f'(2) < f'(1)$$