

# Matlab Final for Math 203

Summer 2009 – Prof. Dodziuk

The exam is due by the end of the day (midnight) on Friday, July 17th. Questions asking you to draw a graph will be graded partly on how good your picture is. So be sure to look at them before finalizing things. Please send the exam to me by email at [jdodziuk@gc.cuny.edu](mailto:jdodziuk@gc.cuny.edu) either as published m-file(s), a text file containing commands needed to do each problem, or you may also list the commands in the body of your message.

1. Plot the graph of  $f(x, y) = y \cos(x) + 2 \sin^2(y)$  for  $-\pi \leq x \leq \pi$  and  $-\pi \leq y \leq \pi$ .
2. Use the symbolic toolkit to calculate  $I = \int_1^4 \sqrt{1+x^4} dx$ . Convert the symbolic expression to a decimal and determine if  $I > 36$ .
3. Consider the series  $\sum_{n=2}^{\infty} (-1)^{n-1}/(n \ln n)$ . Plot on the same graph the values of  $a_n = (-1)^{n-1}/(n \ln n)$  for  $71 \leq n \leq 100$  and the lines  $y = 0.0025$  and  $y = -0.0025$ . Make sure that the plot of points  $(n, a_n)$  consists of dots only while the two lines are solid. Use your plot (and the error estimate that comes from the alternating series test) to determine an integer  $n$  such that the partial sum  $S_n = \sum_{k=2}^n a_k$  approximates the sum  $S = \sum_{k=2}^{\infty} a_k$  with the error smaller than 0.0025.