MATH 31B SECTION 2
FIRST PRACTICE MIDTERM

Please note: Show your work. Correct answers not accompanied by sufficent explanations will receive little or no credit. Please call one of the proctors if you have any questions about a problem. No calculators, computers, PDAs, cell phones, or other devices will be permitted. *If you have a question about the grading or believe that a problem has been graded incorrectly, you must bring it to the attention of the professor within 2 weeks of the exam.*

Problem 1. Let S be the cone obtained by rotating the line triangle bounded by the lines $y = x$, $x = 1$, $y = 0$ about the x-axis. Set up and then evaluate the integral expressing the volume of S using (a) the method of cross-sections and (b) the method of cylindrical shells.

Problem 2. Let S be the region consisting of those points (x, y, z) that lie inside of the sphere of radius 1, and which satisfy $0 \leq x \leq 0.3$. Find the volume of S.

Problem 3. Give an example of a function $f(x)$ for which the trapezoidal rule approximation with $n = 2$ to the integral $\int_0^1 f(x)dx$ is exact (i.e., the error is zero), while the trapezoidal rule approximation to the same integral with $n = 4$ gives a nonzero error. (No formula is necessary; a graph of the function, with explanations, will suffice).

Problem 4. Compute the integral $\int e^{x+e^x} dx$.

Problem 5. Let $f(x) = \sqrt{x^2+1}$, $x \geq 0$. (a) Show that f is one-to-one on $[0, +\infty)$; (b) compute the inverse of $f(x)$; (c) find the derivative of the inverse of $f(x)$ at the point $\sqrt{2}$.

Problem 6. Graph the function $f(x) = e^x + e^{-x}$.