Second Examination
Friday, September 29, 2000

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book, but you may use your calculator and the computers. You may leave after handing in your exam paper, but be sure to check your answers carefully. Give exact values, rather than numerical approximations, unless the problem asks for a numerical approximation. Each entire problem is worth 33 points, and one point is "free."

1. Find each of the following. You must carefully write down each step you take to find the solution, although you may check your result with Mathematica or your calculator.

   (a) $\int_0^1 \dfrac{2000x^{1999}}{1+x^{2000}}dx$

   (b) $\int x^2 \cos(2x)dx$

   (c) $\int_1^2 \dfrac{1}{x^2+3x+2}dx$

2. State whether the following integrals converge. Compute the values of those that do.

   (a) $\int_0^1 \dfrac{d\aleph}{\aleph^{0.7}}$

   (b) $\int_1^\infty \dfrac{d\aleph}{\aleph^{0.7}}$

3. Use comparison to determine whether the following integrals converge. State carefully how you are doing the comparison, and what your conclusions are.

   (a) $\int_0^1 \dfrac{e^x dx}{x^{0.7}}$

   (b) $\int_1^\infty \dfrac{e^{-x}dx}{x^{0.7}}$