Third Examination, second try
Friday, November 3, 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 clopsed 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. Suppose a cylindrical water tank is 30 ft. high and 20 ft. in diameter, and is on a platform 50 feet off the ground. If the water is slowly drained from the tank to run a small electric generator, then how much work does the water in the tank do if the tank is totally emptied? (Water weighs 62.4 lb. per cubic foot.) Convert your result to kilowatt-hours if 1kilowatt-hour $\approx 2.65 \times 10^6$ft-lb.

2. What is the total force on a circular porthole on a submarine, if the porthole is 1 ft. in diameter and the top of the porthole is 3 ft. below the surface? Show all work, and give your answer to the nearest pound.

3. Compute the length of arc of $y = x^2$ for $0 \leq x \leq 1$. Give your answer both as an exact expression and as a decimal approximation.