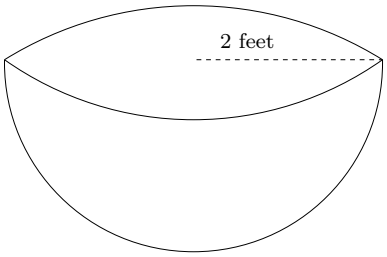
MATH 141 – CALCULUS II
FIRST MIDTERM EXAM

Instructions. Answer each question on a separate answer sheet. Show all your work. Be sure your name, section number, and problem number are on each answer sheet, and that you have copied and signed the honor pledge on the first answer sheet. You may *not* use calculators, notes, or any other form of assistance on this exam.

(1) Compute the volume of the domain of revolution obtained by rotating the region between the curves $y = x^2$ and $y = \sqrt{x}$ about the y-axis.

(2) Suppose a hemispherical drum of radius 2 feet is full of water. You want to pump the water to the rim of the drum, where it then empties over the rim. How much work is expended to pump all of the water out? (you can assume units where the density of water is one unit per cubic foot).



(3) (a) Compute the area of the region bounded by the graphs $f(x) = 3 - x^2$ and $g(x) = x^2 + 1$.
(b) Find the center of mass of the region in part (a).

(4) Compute the length of the curve parametrized by

$$x(t) = \cos t \ , \ y(t) = t - \sin t$$

from $0 \leq t \leq \pi$.

Date: Feb 11, 2011.