MATH 136 – Calculus 2
Discussion Day 4 – Areas and Volumes
March 17, 2014

Group write-ups of solutions for the following problems are due by class time on Wednesday, March 19.

I. Let R be the region bounded by $y = xe^{-x}$, $y = 0$, $x = 0$ and $x = 4$.

A) Sketch the region.
B) A solid has the region R as base and cross-sections perpendicular to the x-axis that are squares (extending the full width of the base). Find the volume.
C) Set up and evaluate the integral to find the volume of the solid obtained if R is rotated about the x-axis.
D) Set up and evaluate the integral to find the volume of the solid obtained if R is rotated about the line $y = -2$.

II. The hull of a boat is 20 feet long. At a distance s feet from the bow (the front), the cross section of the hull has the shape of the region in the plane below $y = 0$ ($y = 0$ is the water line) and above the parabola $y = ax^2 - b$, where a, b are given in the following table:

s	5	10	15	20
a	2	3	4	5
b	2	3	4	4

Estimate the *volume* enclosed by the hull below the waterline $y = 0$.