4. Do WebAssign 8.2. Remember that the WebAssign will be reopened three days before Exam II for you to review the problems. You will be allowed to improve your score by a maximum of three points. Additional attempts on the problems will not be given.

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5. The region bounded by $y = 1/(x+1)$, $y = 0$, $x = 0$, and $x = 1$ is rotated about the x-axis. Find the volume.

The following problems (6-8) concern the region $\mathcal{R}$, which is bounded by $y = x^2$, $y = 1$ and the y-axis for $x \geq 0$. Find the volume of the resulting solids.

6. The solid obtained by rotating the region $\mathcal{R}$ about the line $y = -2$.

7. The solid whose base is the region $\mathcal{R}$ and whose cross-sections perpendicular to the x-axis are semicircles.

8. The solid whose base is the region $\mathcal{R}$ and whose cross-sections perpendicular to the y-axis are equilateral triangles.

Density

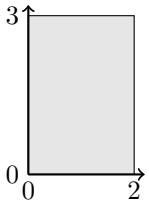
Section 8.4
October 4, 2016

Name:
Math 129 - 01

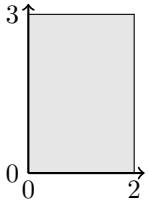
Understand	Know that *total mass* (or population, number of objects, etc.) is given by *density* $\times$ *volume*.
Understand	Slice a region so that the density remains approximately constant on each slice.
Apply	Approximate the total mass (or population, etc.) in a slice in terms of the variable of integration.
Apply	Express the approximate total mass (etc.) of a stack of slices in the form of a Riemann Sum.
Apply	Express the exact total mass (etc.) as a definite integral by taking a limit.
Synthesize	Use slicing skills from ch. 8 with a given density to calculate total mass (etc.) over difficult regions.

1. A rectangular plate occupying the region $0 \leq x \leq 2$, $0 \leq y \leq 3$ has uniform density $\delta = 5$ g/cm^2 as indicated in the diagrams below.

   (a) Set up an integral giving the mass of the plate, with strips in the x-direction.

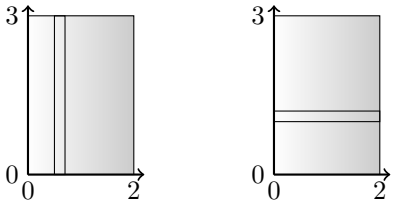
   

   (b) Set up an integral giving the mass of the plate, with strips in the y-direction.

   (c) Is there any difference between the values of the integrals in 1(a) and 1(b)? Why or why not?

2. Now suppose the density is not uniform, but is given by the function $\delta(x) = 5x^2$ g/cm^2 as indicated in the diagram below. Lionel Messi tries to calculate the mass using vertical slices (left) and Cristiano Ronaldo tries to calculate the mass using horizontal slices (right).

   Explain why Messi has a winning strategy and why Ronaldo will not be able to calculate the mass.

   Calculate the mass using vertical slices. (Hint: start like this:)
   Area of a slice = width $\times$ height = $y \times \Delta x = 3 \times \Delta x$.
   Mass of a slice = Density $\times$ Area = $5x^2 \times 3 \times \Delta x$

   Approximate total area =

   Exact total area =

Quiz (Leave this space blank)