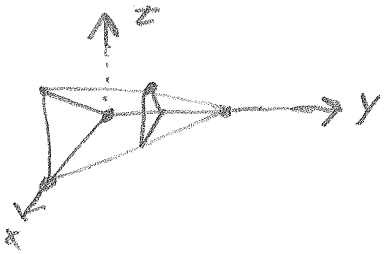
PRINT Your Name:_____

Quiz 7 — February 28, 2014 – Section 8 – 10:50 – 11:40

Remove everything from your desk except this page and a pencil or pen.
The solution will be posted soon after the quiz is given.

Circle your answer. **Show your work. Your work must be correct and coherent.**
The quiz is worth 5 points.

Consider the solid S. The base of S is the triangular region in the xy-plane with vertices $(0,0)$, $(1,0)$, and $(0,1)$. The cross sections of S which are perpendicular to the y-axis are equilateral triangles. Find the volume of S. You must draw a meaningful picture.

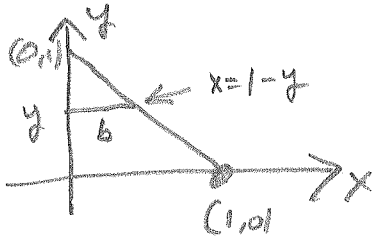


Section 8

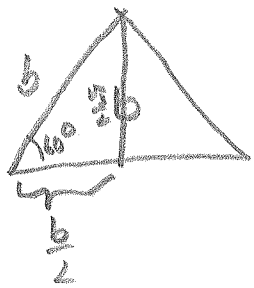
chop the y-axis from 0 to y. For each y-coordinate y consider the slice of the solid whose y-coordinate is y. This slice looks like an equilateral triangle with thickness

The volume of the slice is the area of the face times the thickness $= \frac{1}{2} b h t$

where b is the base, h is the height and t is the thickness.
well $t = dy$. We can figure out b in terms of y



$b = 1-y$.
use trig to find h



$h = \frac{\sqrt{3}}{2} b = \frac{\sqrt{3}}{2}(1-y)$

The vol of one slice is $\frac{1}{2} b h t = \frac{\sqrt{3}}{4}(1-y)^2 dy$

The vol of the solid is $\frac{\sqrt{3}}{4}\int_0^1 (1-y)^2 dy = -\frac{\sqrt{3}}{4}\left[\frac{(1-y)^3}{3}\right]_0^1 = \boxed{\frac{1}{4\sqrt{3}}}$

Check: the solid is a pyramid with base of area $\frac{\sqrt{3}}{4}$. so the volume is $\frac{1}{3}\left(\frac{\sqrt{3}}{4}\right)(1) = \frac{1}{3}\frac{\sqrt{3}}{4}$