

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work correct, complete and coherent.

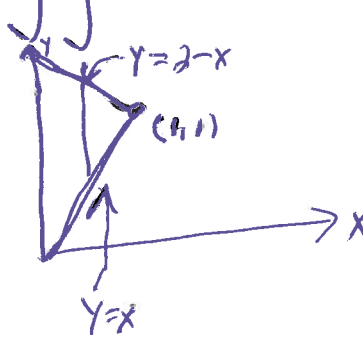
The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 7, November 21, 2017, 1:15 class

Find the volume of the region bounded above by the paraboloid $z = x^2 + y^2$ and below by the triangle enclosed by the lines $y = x$, $x = 0$, and $x + y = 2$ in the xy -plane.

$$\text{Vol} = \iint_{\text{base}} \text{top} \, dA = \iint x^2 + y^2 \, dA = \int_0^1 \int_x^{2-x} x^2 + y^2 \, dy \, dx$$

intersection
 $x + x = 2$
 $x = 1$



$$\begin{aligned} & \int_0^1 \left[x^2 y + \frac{y^3}{3} \right]_x^{2-x} dx = \int_0^1 \left(x^2(2-x) + \frac{(2-x)^3}{3} - x^3 - \frac{x^3}{3} \right) dx \\ &= \int_0^1 \left[2x^2 - \frac{7}{3}x^3 + \frac{(2-x)^3}{3} \right] dx = \left[\frac{2x^3}{3} - \frac{7x^4}{12} - \frac{(2-x)^4}{12} \right]_0^1 \\ &= \frac{2}{3} - \frac{7}{12} - \frac{1}{12} + \frac{16}{12} = \frac{8-3+16}{12} = \frac{16}{12} = \boxed{\frac{4}{3}} \end{aligned}$$