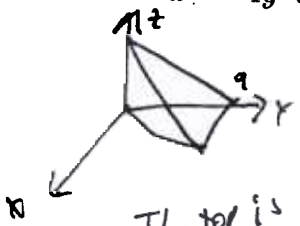
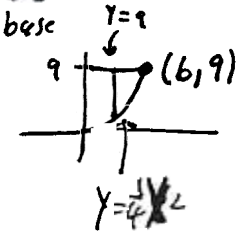
7. (6 points) Find the volume of the solid in the first octant which is bounded by $x^2 = 4y$ and $5y + 9z = 45$.



The top is
$9z = 45 - 5y$
$z = 5 - \frac{5}{9}y$

$$\text{Vol} = \iint_{\text{base}} \text{top}\, dA = \int_0^6 \int_{\frac{1}{4}x^2}^{9} 5 - \frac{5}{9}y \, dy\, dx = \int_0^6 5y - \frac{5}{18}y^2 \Big]_{\frac{1}{4}x^2}^{9} dx$$



$$= \int_0^6 45 - \frac{5}{2}(9) - \frac{5}{4}x^2 + \frac{5}{(18)16}x^4$$

$\frac{45}{2}$

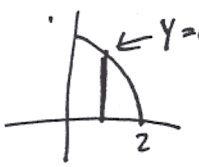
$$\frac{45}{2}x - \frac{5}{12}x^3 + \frac{x^5}{(18)(16)} \Big]_0^6$$

$$= \frac{45}{2}(6) - \frac{5}{2}(36) + \frac{6^5}{18(16)}$$

8. (6 points) Find the volume of the solid in the first octant which is bounded by $x^2 + y^2 = 4$ and $x + y - z = 0$.

The top is $z = x + y$

$$\text{Vol} = \iint_{\text{base}} \text{top}\, dA = \int_0^2 \int_0^{\sqrt{4-x^2}} x + y \, dy\, dx = \int_0^2 xy + \frac{y^2}{2} \Big]_0^{\sqrt{4-x^2}}$$



$$= \int_0^2 x\sqrt{4-x^2} + \frac{4-x^2}{2}\, dx$$

$$= \frac{-1}{2}\frac{2}{3}(4-x^2)^{\frac{3}{2}} + 2x - \frac{x^3}{6} \Big]_0^2$$

$$= 4 - \frac{8}{6} + \frac{(4)^{\frac{3}{2}}}{3} = 4 - \frac{4}{3} + \frac{8}{3} = 4 + \frac{4}{3} = \frac{16}{3}$$