

Taker Name:

Key

GTID: 903

Section:

Grader #1:

GTID: 903

§15.5: Triple integrals

Find the volume of the region D by setting up and computing the value of a triple integral, where D is the solid in the first octant bounded by the three coordinate planes and the planes $x + z = 2$ and $y + \frac{3}{2}z = 3$.

$$\text{Vol} = \iiint_D 1 \, dV$$

Not z -simple!!

y -simple & x -simple!

(using y -simple)

$$R: x \in [0, z]$$

$$z \in [0, 2-x]$$

Then $y = 3 - \frac{3}{2}z$ "top cap" and $y = 0$ "bot cap"

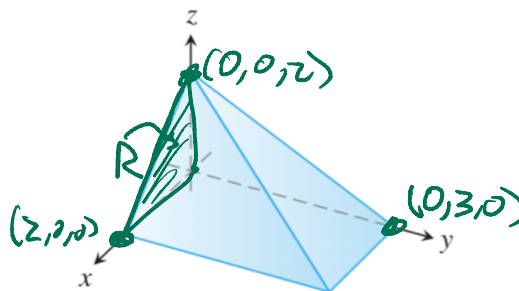
$$\text{So } \text{Vol} = \iint_R \left(\int_0^{3-\frac{3}{2}z} 1 \, dy \right) dA$$

$$= \int_0^2 \int_0^{2-x} \left(y \Big|_0^{3-\frac{3}{2}z} \right) dz \, dx$$

$$= \int_0^2 \int_0^{2-x} 3 - \frac{3}{2}z \, dz \, dx = \int_0^2 3z - \frac{3}{4}z^2 \Big|_0^{2-x} dx$$

$$= \int_0^2 6 - 3x - \frac{3}{4}(4 - 4x + x^2) \, dx = \int_0^2 3 - \frac{3}{4}x^2 \, dx$$

$$= 3x - \frac{1}{4}x^3 \Big|_0^2 = 6 - \frac{8}{4} = \boxed{4}$$



A	
J	
N	
A	
J	
N	
A	
J	
N	