Taker Name: *Key*   GTID: 903   Section:
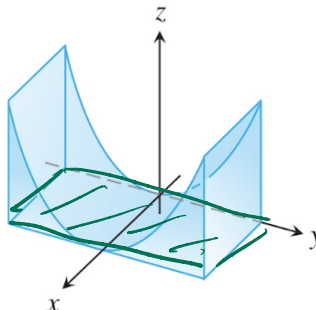
Grader #1:   GTID: 903

§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 with top cap defined by $z = y^2$ and rectangular base R on the xy-plane with $0 \le x \le 2, -3 \le y \le 3$.

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

over

R: $0 \le x \le 2$
$-3 \le y \le 3$ base

$z = y^2$ top cap, $z = 0$ bot cap

so $\text{Vol} = \iint_R \left(\int_0^{y^2} 1 \, dz \right) dA$

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

$$= \int_0^2 \int_{-3}^3 y^2 \, dy \, dx$$

$$= \int_0^2 \tfrac{1}{3} y^3 \Big|_{-3}^3 \, dx = \int_0^2 9 - (-9) \, dx$$

$$= \int_0^2 18 \, dx = 18x \Big|_0^2 = (18)(2) = \boxed{36}$$

A

J

N

A

J

N

A

J

N