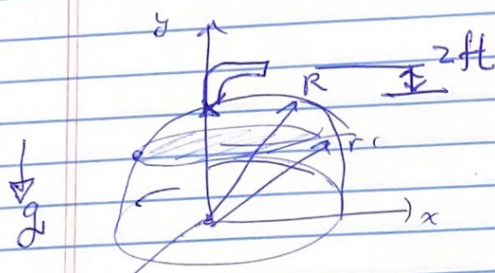


Another example of tank pumping



evacuate a giant
Hemispherical tank

tank proportions

$$R = 10 \text{ ft}$$

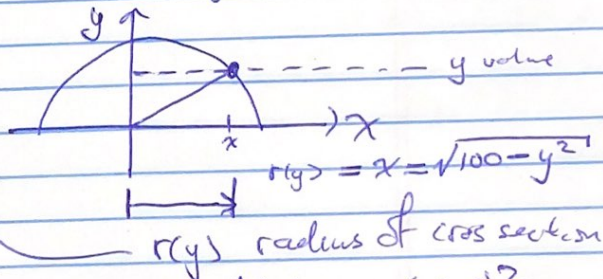
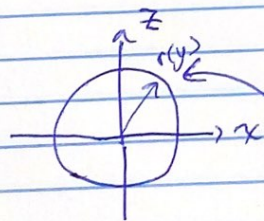
$$x^2 + y^2 + z^2 = 100$$

tank full of Benzene, with weight density $\rho_w = 56 \frac{\text{lb}}{\text{ft}^3}$

the pump sits 2 ft above the highest point on the tank.

How much work to empty?

• Slice: a circular cross section perpendicular to y-axis



Cross sectional area: $A(y) = \pi(r(y))^2$

Weight force of cross section: $\rho_w \cdot (A(y) dy)$

distance traveled by cross section: $12 \text{ ft} - y$

Bounds of integ: 0 to 10 ft

$$W = \int_0^{10 \text{ ft}} (12 \text{ ft} - y) (\pi (100 - y^2) \rho_w dy)$$