

Problem Set I

Question: A conical container of radius 6ft and height 24ft is filled to a height of 20 ft of a liquid weighing 50.6 lb/ft³.

(a) How much work will it take to pump the contents to the rim?

Solution:

$$W = \int_0^{20} 50.6\pi(24 - y) \left(\frac{y}{4}\right)^2 dy$$

(b) How much work will it take to pump the liquid to a level of 4ft above the cone's rim?

Solution:

$$W = \int_0^{20} 50.6\pi(28 - y) \left(\frac{y}{4}\right)^2 dy$$