

Problem Set 6

Consider the surface of revolution formed by revolving the curve $y = x^2$ over the interval $[0, 2]$ about the y -axis. This surface is known as a *paraboloid*.

(a) Compute the surface area of this paraboloid bowl if its rim measures 2 meters across.

(b) Compute the weight of the paraboloid bowl if it is filled with water (density = 997 kg/m^3).

(c) Compute the work needed to lift the bowl 20 meters using a rope that weights 1 kg/m.

(d) A circular cap is installed on the bowl and the whole container is rotated so that the cap is vertical. How much force must the cap resist to stay affixed on the bowl?