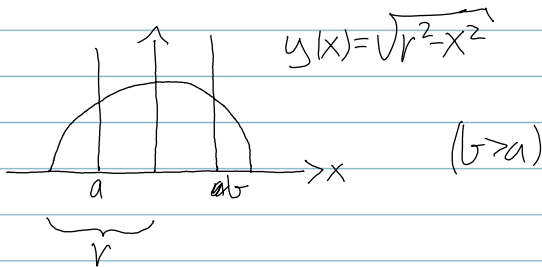
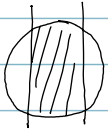


7.4.34] Two parallel planes intersect a sphere. Find the surface area of the part of the sphere between the two planes.

SOLUTION



$$S_{ab} = \int_a^b 2\pi y(x) ds \quad ds = \sqrt{1 + y'(x)^2} dx, \quad y'(x) = \frac{-x}{\sqrt{r^2 - x^2}}$$

$$= 2\pi \int_a^b \sqrt{r^2 - x^2} \sqrt{1 + \frac{x^2}{r^2 - x^2}} dx$$

$$= 2\pi \int_a^b r dx$$

$$= 2\pi(b-a)r$$

$$a=b=0 \Rightarrow S_{ab} = 0$$

$$a=-r, b=r \Rightarrow S_{ab} = 4\pi r^2$$