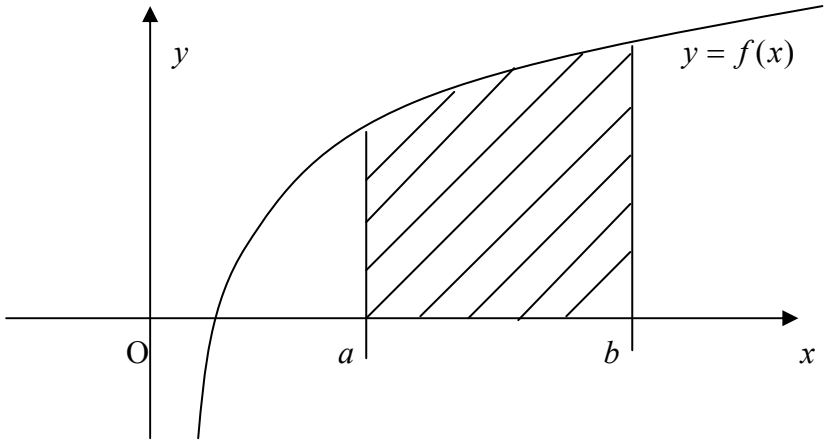
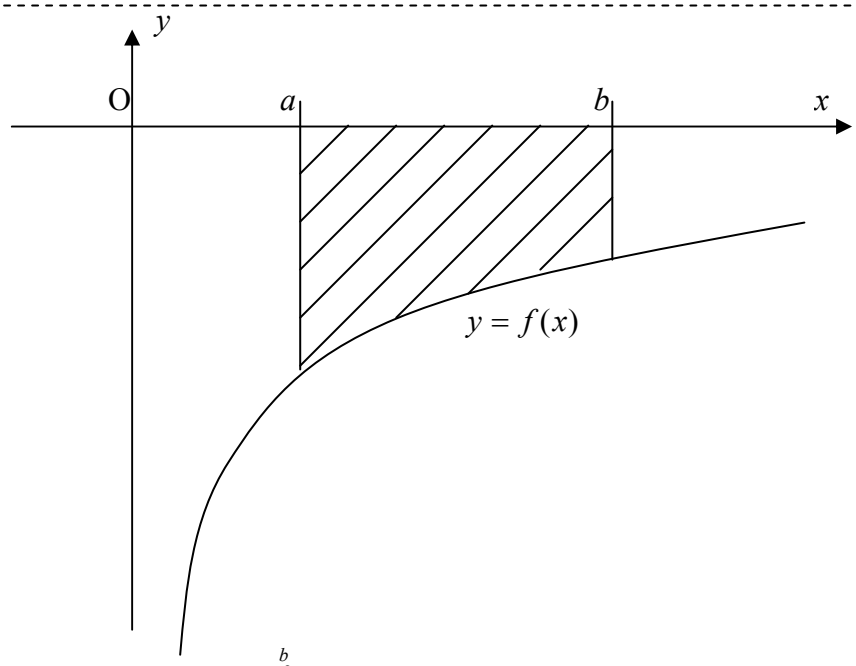
Applications of Integration Summary

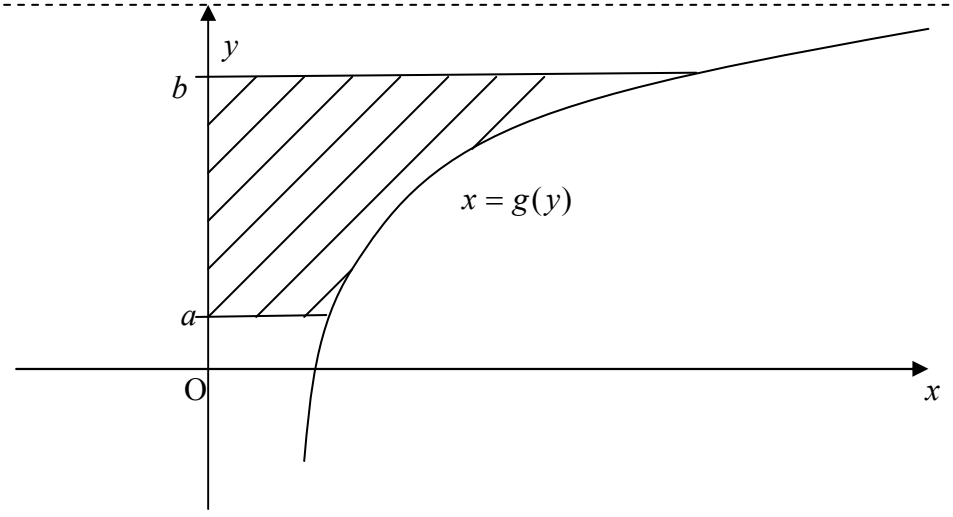
1. Area under curve:



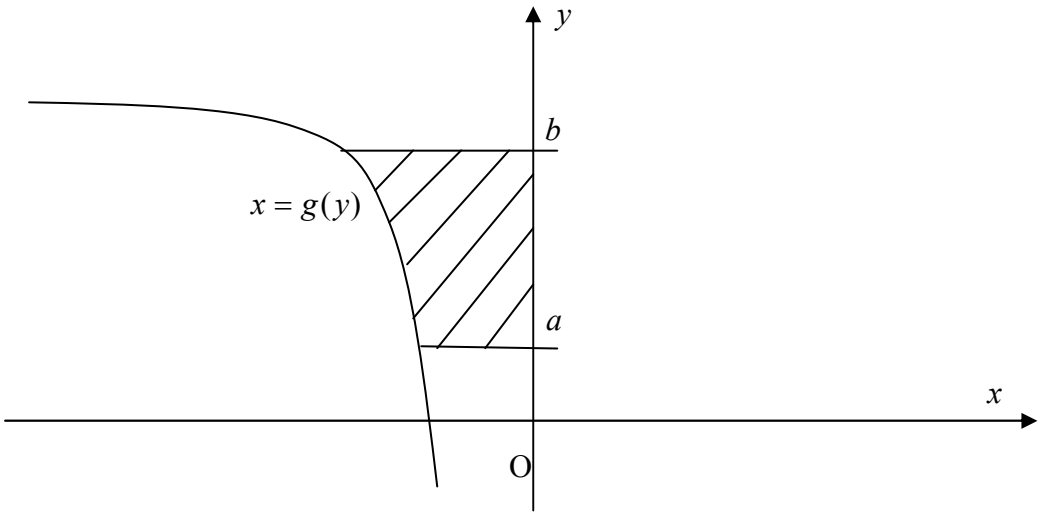
Area of shaded region= $\int_a^b f(x)dx$



Area of shaded region= $\left|\int_a^b f(x)dx\right|$

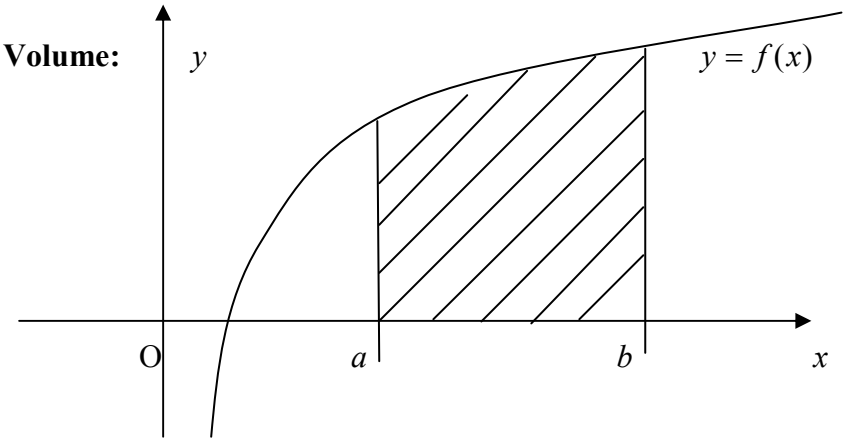


Area of shaded region= $\int_a^b g(y)dy$

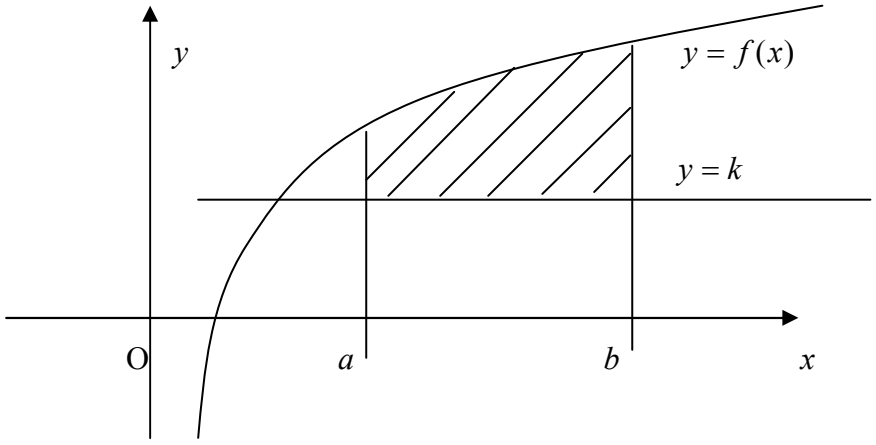


Area of shaded region= $\left|\int_a^b g(y)dy\right|$

2. Volume:



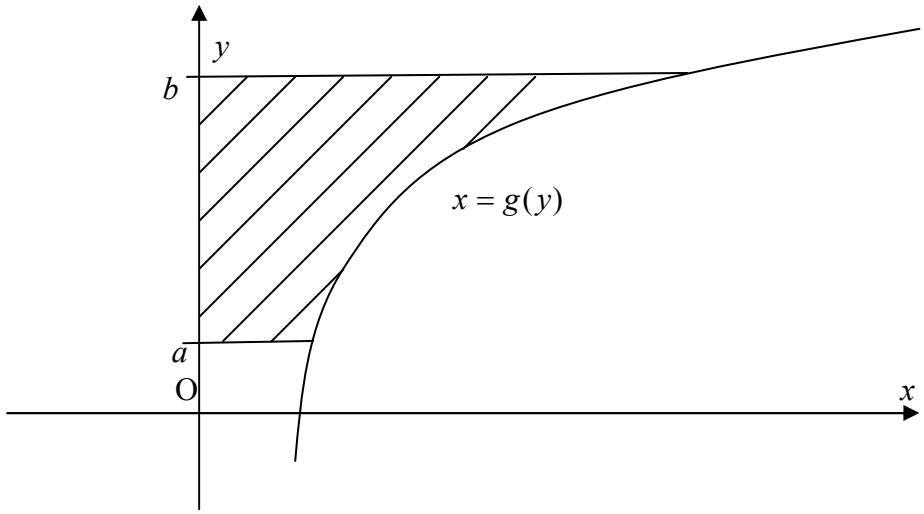
Volume of shaded region revolved 2π about the $x-$axis $=\pi\int_a^b [f(x)]^2\,dx$



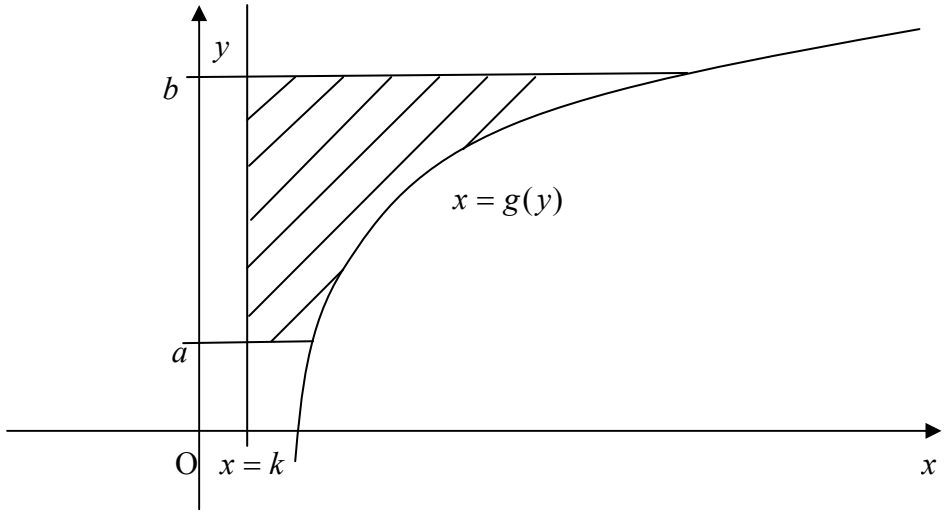
Volume of shaded region revolved 2π about the $y = k$ line $= \pi \int_a^b [f(x) - k]^2 \, dx$

Volume of shaded region revolved 2π about the $x-$axis

$$= \pi \int_a^b [f(x)]^2 \, dx - \pi\left(k^2\right)(b - a)$$



Volume of shaded region revolved 2π about the $y-$axis $= \pi \int_a^b [g(y)]^2 \, dy$



Volume of shaded region revolved 2π about the $x = k$ line $= \pi \int_a^b [g(y) - k]^2 \, dy$

Volume of shaded region revolved 2π about the $y-$axis

$$= \pi \int_a^b [g(y)]^2 \, dy - \pi\left(k^2\right)(b - a)$$