Section 6.2 Solutions

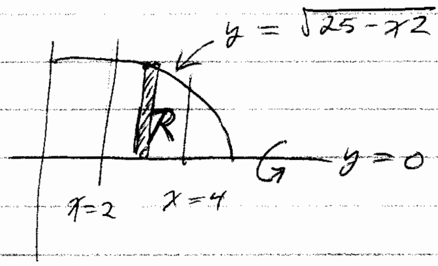
math 31

4. $V = \int_2^4 \pi y^2\,dx$

$= \int_2^4 \pi(25-x^2)\,dx$

$= \pi\left[25x - \frac{1}{3}x^3\right|_2^4$

$= \pi\left[\left(100-\frac{64}{3}\right) - \left(50-\frac{8}{3}\right)\right] = \boxed{\frac{94}{3}\pi}$

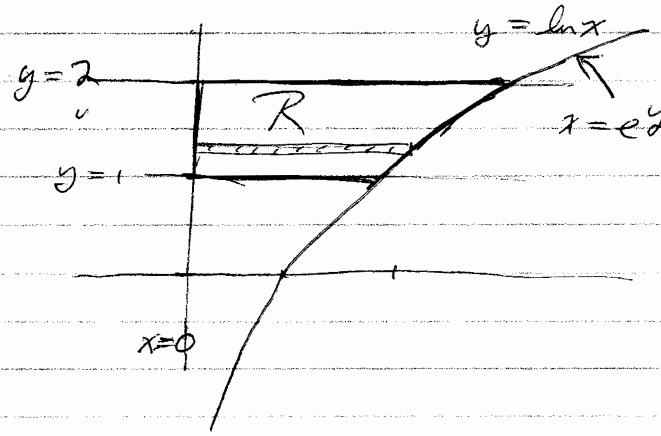


6. Rewrite $y = \ln x$ as $x = e^y$, then

$V = \int_1^2 \pi x^2\,dy$

$= \int_1^2 \pi e^{2y}\,dy = \frac{1}{2}\pi\left[e^{2y}\right|_1^2$

$= \boxed{\frac{1}{2}\pi\left(e^4 - e^2\right)}$



12. $V = \int_0^2 \pi(r_o^2 - r_i^2)\,dx$

where $r_o = 2 - e^{-x}$ and

$r_i = 2 - 1 = 1$, so

$V = \int_0^2 \pi\left[(2-e^{-x})^2 - 1^2\right]dx$

$= \int_0^2 \pi\left[4 - 4e^{-x} + e^{-2x} - 1\right]dx$

$= \pi\int_0^2\left[3 - 4e^{-x} + e^{-2x}\right]dx = \pi\left[3x + 4e^{-x} - \frac{1}{2}e^{-2x}\right|_0^2$

$= \pi\left[\left(6 + 4e^{-2} - \frac{1}{2}e^{-4}\right) - \left(0 + 4 - \frac{1}{2}\right)\right]$

$= \boxed{\pi\left[\frac{5}{2} + \frac{4}{e^2} - \frac{1}{2e^4}\right]}$