

1. Show that $I = \int_1^{\infty} x^3 e^{-x^2} dx$ converges by evaluating the integral and finding its exact value.
2. Let $I = \int_0^{\pi/4} \sqrt{1 + 4x^2 \sec(x^2)^4} dx$
 - (a) Find a value of n so that M_n approximates I accurate within 0.001.
 - (b) Interpret I as an area, as a volume, and as an arc length.
3. Let R be the region bounded by $y = -x^2 - x + 6$ and the x -axis. Find volume when R is rotated about the line $y = -2$