

PHYS 325: Computational Physics III

Winter 2023

Exercise 3.2

1. Use Monte-Carlo integration to estimate the area and mass of the two-dimensional region (x, y) defined by $x^2 + 4y^2 < 1$, $y^2 < x$, and $x + y < 0.5$. The surface density of the material in the region is $\sigma(x, y) = x^2 + y^2$. Perform your calculation with $N = 10^4$ and $N = 10^6$ random points in the region under consideration. What are the estimated errors in each calculation?