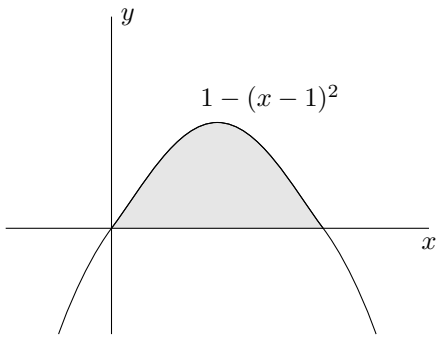
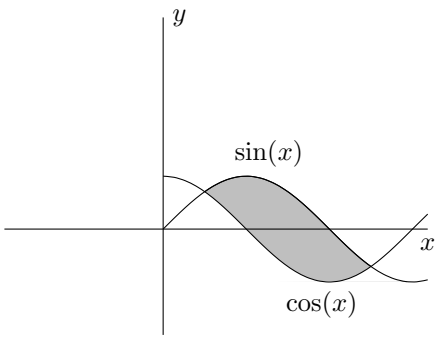
Double Integrals

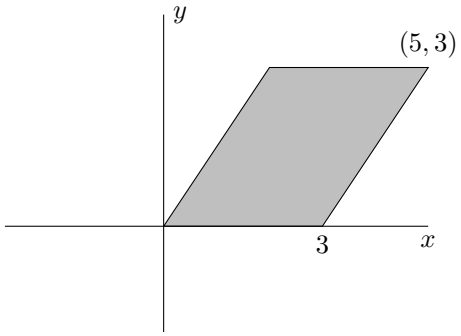
Set up some Double Integrals. Write down integrals, which if compute, would find the volume under a function $f(x, y)$ over the shaded region.



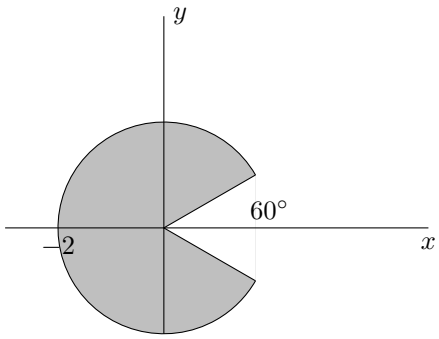
$\int_{x=0}^{1} \int_{y=0}^{y=1-(x-1)^2} f(x,y)dydx$

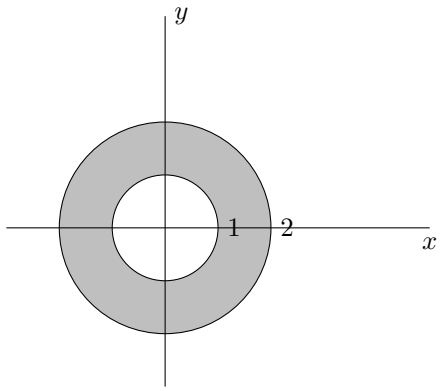


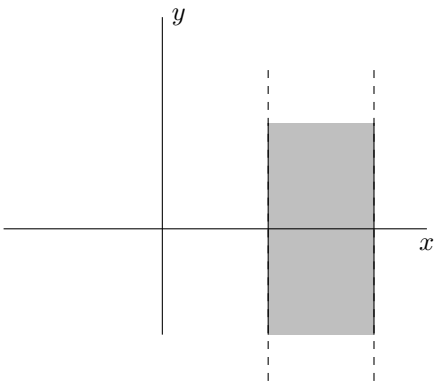
$\int_{x=\pi/4}^{5\pi/4} \int_{y=\cos x}^{\sin x} f(x,y)dydx$



$\int_{y=0}^{3} \int_{x=2/3y} x = 2/3y + 3f(x,y)dxdy$







$(5, 3)$

Integration. Compute the volume of a sphere by using a double integral for the region $x^2 + y^2 \leq 1$ and the function $\sqrt{1 - x^2 + y^2}$.

Average Value. What is the average value of the function $x/(1 + xy)$ on the square $[0, 2] \times [0, 2]$?