

1. Find the volume of the solid that lies under the paraboloid  $z = x^2 + y^2$  and above the region  $R$  in the  $xy$ -plane bounded by  $y = 2x$  and  $y = x^2$ .
2. Evaluate  $\iint_R x y \, dA$  where  $R$  is the region in the  $xy$ -plane bounded by  $y = x + 1$  and  $y^2 = x + 3$ .
3. Evaluate  $\iint_R 2x - y \, dA$  where  $R$  is the upper half of the circle with center at the origin and radius 2.
4. Evaluate  $\int_0^1 \int_{x^2}^1 x^3 \sin(y^3) \, dy \, dx$