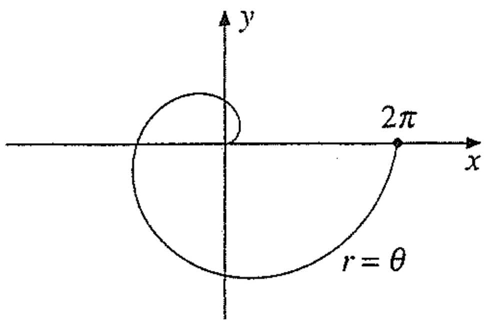
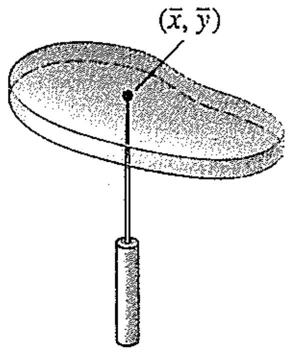
Eksempel 11.5.5 Finn arealet av det lukkede området i $\mathbb{R}^2$ begrenset av polarkurven $r = \theta$ for $0 \leq \theta \leq 2\pi$ og den positive delen av x-aksen.

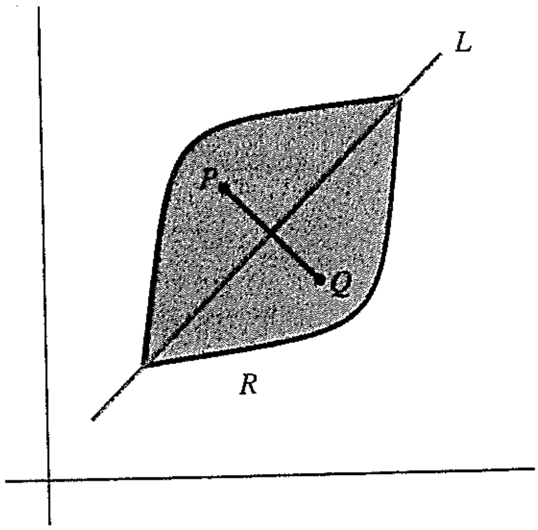
S. 553 LHL



EXAMPLE 2 Computing area in polar form using a double integral

Compute the area of the region D bounded above by the line $y = x$ and below by the circle $x^2 + y^2 - 2y = 0$.





S. 969

EXAMPLE 2 Finding a center of mass

Locate the center of mass of the lamina of density $\delta(x, y) = x^2$ that occupies the region R bounded by the parabola $y = 2 - x^2$ and the line $y = x$.

FIRST THEOREM OF PAPPUS **Volume of Revolution** S. 971

Suppose that a plane region R is revolved around an axis in its plane (Fig. 14.5.8), generating a solid of revolution with volume V. Assume that the axis does not intersect the interior of R. Then the volume

$$V = A \cdot d$$

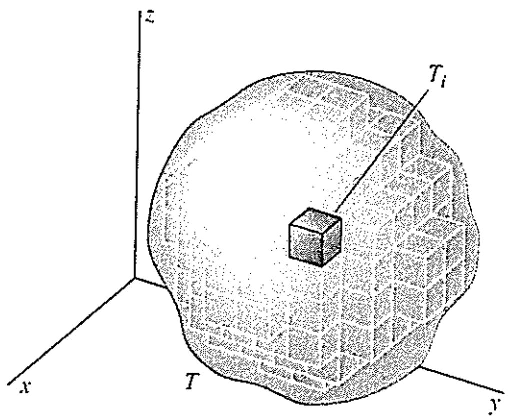
of the solid is the product of the area A of R and the distance d traveled by the centroid of R.

s. 589 LHL

Eksempel 11.10.5 En plate D med konstant massetetthet δ har fasong som et kvadrat med side a. Den dreies omkring en akse som står normalt på platen i det ene hjørnet. Finn treghetsmoment til platen.

s. 975

EXAMPLE 10 Find the polar moment of inertia of a circular lamina R of radius a and constant density δ centered at the origin.



Evaluate $\iiint\limits_B z^2 y e^x \, dV$, where B is the box given by

$$0 \leq x \leq 1, \quad 1 \leq y \leq 2, \quad -1 \leq z \leq 1$$

$$m = \iiint_T \delta \, dV.$$ s. 980

The case $\delta \equiv 1$ gives the **volume**

$$V = \iiint_T dV$$

of T. The coordinates of its **centroid** are

$$\bar{x} = \frac{1}{m} \iiint_T x\delta \, dV,$$

$$\bar{y} = \frac{1}{m} \iiint_T y\delta \, dV, \quad \text{and}$$

$$\bar{z} = \frac{1}{m} \iiint_T z\delta \, dV.$$

The **moments of inertia** of T around the three coordinate axes are

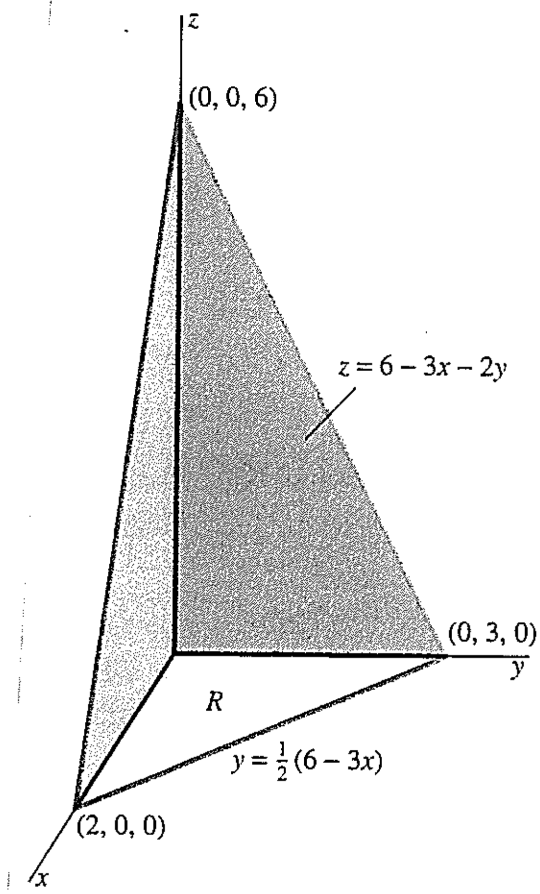
$$I_x = \iiint_T (y^2 + z^2)\delta \, dV,$$

$$I_y = \iiint_T (x^2 + z^2)\delta \, dV, \quad \text{and}$$

$$I_z = \iiint_T (x^2 + y^2)\delta \, dV.$$

EXAMPLE 2 Find the mass m of the pyramid T of Fig. 14.6.4 if its density function is given by $\delta(x, y, z) = z$.

s. 981



Eksempel 11.6.9 Finn massen til

$$T: \quad 0 \leq z \leq y, \quad 0 \leq y \leq 1 - x^2, \quad -1 \leq x \leq 1$$

når massetettheten er $\delta(x, y, z) = \dfrac{\sin z}{(1-z)^{3/2}}$.

s. 563 LHL