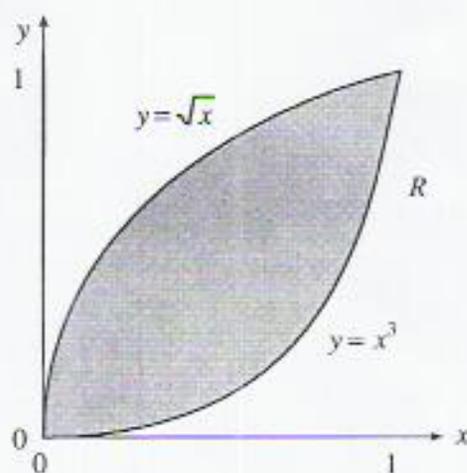


2. The region R over which the double integral

$$I = \iint_R (x+y) dx dy$$

is integrated is shown in the figure.



- (a) Write I as a repeated integral, integrating with respect to y first, and calculate its value. [5]
- (b) Write I as a repeated integral in which the integration with respect to x is carried out first. (You are not required to calculate the value of this repeated integral.) [3]
3. The level surfaces of the function $w = f(x, y, z) = 3x^2 + 2y^2 + z^2 - 6$ are the ellipsoids $w = \text{constant}$.
- (a) Find the level surface which passes through $(1, 1, 1)$. [1]
- (b) Find the vector $\text{grad } f$ and use it to find a vector normal to the level surface at $(1, 1, 1)$. [2]
- (c) Find the equation of the tangent plane to the level surface at $(1, 1, 1)$. [2]
- (d) Find the equation of the plane which passes through $(1, 1, 1)$ and which contains the normal to the level surface at $(1, 1, 1)$ and the radius vector joining the origin to $(1, 1, 1)$. [4]