Area and volume by double integral

Area of the region D by double integral :

The area of the region D in the xy-plane is given by $A = \iint_D dx\,dy = \iint_D dA$.

Q1. The area enclosed between the curves $|x| + |y| \geq 2$ and $y^2 = 4\left(1 - \frac{x^2}{9}\right)$ is

(a) $(6\pi - 4)$ sq. units

(b) $(6\pi - 8)$ sq. units

(c) $(3\pi - 4)$ sq. units

(d) $(3\pi - 2)$ sq. units

Q2. Let the straight line x = b divides the area enclosed by $y = (1-x)^2$, $y = 0$ and $x = 0$ into two parts $R_1(0 \le x \le b)$ and $R_2(b \le x \le 1)$ such $R_1 - R_2 = \frac{1}{4}$. Then b equals

(a) 3/4 (b) 1/2

(c) 1/3 (d) 1/4

Volume by double integration :

The volume of solids by double integration is $\iint z\,dx\,dy$, where z = f(x, y) is given surface in x & y variable.

Q.3. A triangle in xy-plane is bounded by straight line $2x = 3y$, $y = 0$ and $x = 3$, then volume above the triangle and under the plane $x + y + z = 6$ **GATE-2016**

(a) 5 (b) 10

(c) 15 (d) 20

Q.4. The volume of the solid cut off by the surface $z = (x + y)^2$ from the right prism whose base in the plane $z = 0$ is the triangle by the lines $x = 0$, $y = 0$, $x + y = 1$.

(a) 0 (b) 1/2

(c) 1/3 (d) 1/4

Q.5. The volume of the cylinder with base as the disc of unit radius in the xy-plane centred at (1, 1) and top being the surface $z = [(x-1)^2 + (y-1)^2]^{3/2}$. **IIT JAM – 2005**

(a) π (b) 2π

(c) $\dfrac{2\pi}{3}$ (d) $\dfrac{2\pi}{5}$

Q.5. Consider the open rectangle $G = \{(s,t) \in R^2 : 0 < s < 1$ and $0 < t < 1\}$ and the map $T : G \rightarrow R^2$ given by $T(s,t) = \left(\frac{\pi s(1-t)}{2}, \frac{\pi(1-s)}{2}\right)$ for $(s,t) \in G$ Then the area of the image T(G) of the map T is equal to **IIT JAM 2022**

(a) $\pi/4$ (b) $\pi^2/4$

(c) $\pi^2/8$ (d) 1