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APPLIED MATHEMATICS (BAS-101)

Tutorial Sheet -7
(Integral Calculus)

Que 1. Evaluate $\int_2^3 \int_1^2 \frac{dx\,dy}{xy}$.

Que 2. Evaluate $\int_0^{\pi/2} \int_0^{\pi/2} \sin(x+2y)\,dx\,dy$.

Que 3. By changing the order of integration, evaluate

$$\int_0^3 \int_1^{\sqrt{4-y}} (x+y)\,dx\,dy.$$

Que 4. Change the order of integration $\int_0^1 \int_{e^x}^e \frac{dy\,dx}{\log y}$ and hence evaluate it.

Que 5. Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)}\,dx\,dy$, by changing to polar coordinates.

Que 6. Evaluate $\iint (a-x)^2\,dx\,dy$ over the right half of the circle $x^2+y^2=a^2$, by changing to polar coordinates.

Que 7. Evaluate $\int_{x=0}^2 \int_{y=1}^3 \int_{z=1}^2 xy^2z\;dz\,dy\,dx$.

Que 8. Evaluate $\int_{x=0}^1 \int_{y=0}^{1-x} \int_{z=0}^{1-x-y} dz\,dy\,dx$.

Que 9. Find the area enclosed by the curves $y=2-x$ and $y^2=2(2-x)$ using double integration.

Que 10. Find the area bounded by the parabola $y^2=4ax$ and its latus rectum.

Que 11. Find the volume of the tetrahedron bounded by the coordinates planes and the plane $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$.

Answer Key

Ans 1. $\log 2 \ . \log\left(\frac{3}{2}\right)$

Ans 2. 1

Ans 3. $\frac{241}{60}$

Ans 4. (e-1)

Ans 5. $\frac{\pi}{4}$

Ans 6. $\frac{a^4}{24}\ (15\ \pi - 32)$

Ans 7. 26

Ans 8. $\frac{1}{6}$

Ans 9. $\frac{2}{3}$

Ans 10. $\frac{8a^2}{3}$

Ans 11. $\frac{1}{6}abc$