

TUTORIAL 8

Multiple Integrals-I

Q:1	Evaluate the following integrals:			
	(a) $\int_0^2 \int_0^3 (3x^2 - y) dx dy$	(b) $\int_{-3}^2 \int_3^5 (2 - 3x^2 + y^2) dx dy$		
	(c) $\int_2^5 \int_0^1 xy dx dy$	(d) $\int_1^5 \int_0^2 xy^2 dy dx$		
	(e) $\int_0^2 \int_0^3 (x - y^2) dy dx$	(f) $\int_0^5 \int_{-2}^1 xe^{-y} dx dy$		
	(g) $\int_1^2 \int_0^1 \frac{x}{y} dx dy$	(h) $\int_1^2 \int_2^3 \left(\frac{y}{x} - \frac{x}{y}\right) dx dy$		
	(i) $\int_1^2 \int_1^3 \frac{dydx}{xy}$	(j) $\int_0^1 \int_0^4 (1-x)(4-y) dx dy$		
	(k) $\int_0^1 \int_0^{ln 2} e^{x+y} dx dy$	(l) $\int_0^{\frac{\pi}{4}} \int_0^{\frac{\pi}{4}} \cos(x+y) dx dy$		
	(m) $\int_0^2 \int_0^1 xe^{xy} dy dx$	(n) $\int_0^{\frac{\pi}{2}} \int_0^1 e^y \cos x dy dx$		
	(o) $\int_0^1 \int_0^{\sqrt{4-x^2}} x^2 y dy dx$	(p) $\int_0^2 \int_0^{1-y} (x-2y) dx dy$		
	(q) $\int_0^{-1} \int_{x^2}^{2x} x^3 dy dx$	(r) $\int_{-1}^1 \int_{y^2}^1 dx dy$		
	(s) $\int_0^1 \int_{x^2}^x (x^2 y + xy^2) dy dx$	(t) $\int_1^2 \int_y^{y^3} e^{\frac{x}{y}} dx dy$		

TUTORIAL 9

Multiple Integrals-II

Q:1	Evaluate the following integrals:		
(i)	$\int \int (x - y) dx dy$ over the region bounded by $x = 0, x = 1$ $y = x, y = 2 - x^2$		
(ii)	$\int \int (x + y) dx dy$ over the triangular region bounded by $x = 0, y = 0$ and $x + y = 2$.		
(iii)	$\int \int y dx dy$ over the area between the parabolas $y^2 = 4x$ & $x^2 = 4y$		
(iv)	$\int \int xy dx dy$ over the area bounded by $x^2 + y^2 = 1$.		
Q-2	Evaluate the following integrals by changing the order of integration.		
	(i) $\int_0^1 \int_{3y}^3 e^{x^2} dx dy$	(ii) $\int_0^3 \int_1^{4-y} (x + y) dx dy$	
	(iii) $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$	(iv) $\int_0^1 \int_x^{\sqrt{1-x^2}} y^2 dx dy$	
	(v) $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$	(vi) $\int_0^2 \int_{\frac{y}{2}}^1 (x + y)^2 dx dy$	
	(vii) $\int_0^2 \int_{x^2}^4 xe^{y^2} dy dx$		

TUTORIAL 10
Multiple Integrals-III

Q-1	Evaluate the following integrals by transforming into polar coordinates: $(i) \int_0^2 \int_x^{\sqrt{8-x^2}} \frac{1}{5+x^2+y^2} dy dx \quad (ii) \int_{-3}^3 \int_0^{\sqrt{9-x^2}} \sqrt{x^2 + y^2} dy dx$ $(iii) \int_0^{\frac{1}{\sqrt{2}}} \int_0^{\sqrt{1-y^2}} \frac{y^2}{\sqrt{x^2+y^2}} dx dy \quad (iv) \int_0^1 \int_0^{\sqrt{1-y^2}} e^{x^2+y^2} dx dy$ $(v) \int_{-5}^{5 \sqrt{25-x^2}} \int_0^x (4x + 3y) dy dx \quad (vi) \int_0^{2 \sqrt{2x-x^2}} \int_0^x (x^2 + y^2) dy dx$		
Q-2	Find the area of region bounded by parabola $x = y^2$ and the line $y = x$.		
Q-3	Find the area of region R enclosed by $y = x^2$ and $y = x + 2$.		
Q-4	Find the area bounded by $2x - 3y + 4 = 0$, $x + y - 3 = 0$ and the X –axis.		
Q-5	Find the area bounded by $y = x^2$ and $y = 2x + 3$.		
Q-6	Find the area bounded by $y^2 = 4x$ and $x^2 = 4y$.		
Q-7	Evaluate the following triple integrals:		
	$(a) \int_0^1 \int_0^1 \int_0^1 e^{x+y+z} dx dy dz \quad (b) \int_0^1 \int_0^2 \int_1^2 x^2 yz dz dy dx$		
	$(c) \int_0^1 \int_0^1 \int_0^1 e^{x+y+z} dx dy dz \quad (d) \int_0^1 \int_0^2 \int_1^2 x^2 yz dz dy dx$		
	$(e) \int_0^1 \int_0^x z dx dy dz \quad (f) \int_1^3 \int_{\frac{1}{x}}^1 \int_0^{\sqrt{xy}} xyz dz dy dx$		