Indian Institute of Technology Mandi

IC 110: B.Tech. I year

Odd Semester 2013-14
Tutorial-7 (Double and Triple integrals)

1. Write an equivalent double integral with order of integration reversed:

    (a) $\displaystyle\int_{1}^{e^x}\int_{0}^{1} dxdy$ 　　　　　(b) $\displaystyle\int_{0}^{0}\int_{\sqrt{y}}^{1} dxdy$

2. Find area of region bounded by the multiple curves $y^2 = -x$ and $y^2 = 2y + x$.

3. Evaluate $\iint x^2 dxdy$ over the region lying in the first quadrant and bounded by $xy = 16$, $y = x$, $y = 0$ and $x = 8$.

4. Evaluate $\iint x^2 dxdy$ over the region lying in the first quadrant and bounded by $xy = 16$, $y = x$, $y = 0$ and $x = 8$.

5. Evaluate $f(x, y) = (x+1)y$ over A, where A is the triangle with vortices $(0, 0)$, $(2, 0)$, $(1, 1)$.

6. Write an equivalent double integral with order of integration reversed:

    (a) $\displaystyle\int_{1}^{e^x}\int_{0}^{1} dxdy$ 　　　　　(b) $\displaystyle\int_{0}^{0}\int_{\sqrt{y}}^{1} dxdy$

7. Evaluate $\displaystyle\iint \sqrt{\dfrac{1-\dfrac{x^2}{a^2}-\dfrac{y^2}{b^2}}{1+\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}}}$ over the positive quadrant of the ellipse $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=1$.

8. Evaluate $\displaystyle\iint \sqrt{\dfrac{1-x^2-y^2}{1+x^2+y^2}}\,dxdy$ over the positive quadrant of the circle $x^2 + y^2 = 1$.

9. Evaluate the following triple integrals

    (a) $\displaystyle\iiint_{x^2+y^2+z^2\leq 1} (z^2 + z)dxdydz$

    (b) $\displaystyle\iiint_{x^2+y^2+z^2\leq 1} x^2 dxdydz$

    (c) $\displaystyle\iiint \dfrac{1}{(x+y+z+1)^3}dxdydz$ over the tetrahedron bounded by the planes $x = 0$, $y = 0$, $z = 0$ and $x + y + z = 1$.