BRAC University

Home Work sheet # 5

MAT – 216

1. Evaluate the line integral $\int_C (xy + z^3)\,ds$ from (1,0,0) to (-1,0,0) along the helix C that is represented by the parametric equation x = cost, y = sin t , z = t $(0 \le t \le \pi)$.

2. Evaluate $\int_C xy\,dx + x^2\,dy$ if

   (a) C consists of line segments from (2,1) to (4,1) and from (4,1) to (4,5).

   (b) C is the line segment from (2,1) and (4,5).

   (c) Parametric equation for C are x = 3t – 1, y = $3t^2$ – 2t ; $1 \le t \le 5/3$.

3. Show that (a) $\int (6x^2y - 3xy^2)\,dy + (6xy^2 - y^3)dx$ is independent of the path joining the points (1,2) and (3,4) (b) hence evaluate the integral.

4. Let $F(x,y) = (3x^2y + 2)\,i + (x^3 + 4y^3)\,j$ represents a force field .

   Determine if $\int_C F.\,dr$ is independent of path if it is , find a potential function ϕ .

5. Let $F(x,y) = 2xy^3\,i + (1 + 3x^2y^2)\,j$

   (a) Show that F is a Conservative Vector field on the entire xy – plane ,

   (b) find f by first integrating $\frac{\partial f}{\partial x}$,

   (c) find f by first integrating $\frac{\partial f}{\partial y}$.

6. Use the potential function obtained in example (7) to evaluate the integral

   $\int_{(1,4)}^{(3,1)} 2xy^3\,dx + (1 + 3x^2y^2)\,dy$.

From Book :- (Calculus, Howard Anton 10th edition, soft copy)

Triple Integral
Exercise set 15.2 - (7-12), 14, (19-32)

INDEPENDENCE OF PATH; CONSERVATIVE VECTOR FIELDS
Exercise set 15.3 - (1-6), (9-14)

Green's theorem
Exercise set 15.4 - 1-14