BRAC University
MAT-215
Exercise Sheet # 4 (PART A)

1. Evaluate $\int_{(0,1)}^{(2,5)} (3x+y)dx + (2y-x)dy$ along

   (a) the curve $y = x^2 + 1$

   (b) the straight line joining $(0,1)$ and $(2,5)$

   (c) the straight lines from $(0,1)$ to $(0,5)$ and then from $(0,5)$ to $(2,5)$

   (d) the straight lines from $(0,1)$ to $(2,1)$ and then from $(2,1)$ to $(2,5)$.

2. Evaluate $\oint_C (x+2y)\,dx + (y-2x)dy$ around the ellipse C defined by $x = 4\cos\theta$, $y = 3\sin\theta$, $0 \le \theta \le 2\pi$ if C is described in a counterclockwise direction.

3. Evaluate $\int_C (x^2 - iy^2)\,dz$ along

   (a) the parabola $y = 2x^2$ from $(1,1)$ to $(2,8)$

   (b) the straight lines from $(1,1)$ to $(1,8)$ and then from $(1,8)$ to $(2,8)$

   (c) the straight line from $(1,1)$ to $(2,8)$.

4. Evaluate $\oint_C |z|^2\,dz$ around the square with vertices at $(0,0), (1,0), (1,1), (0,1)$.

5. Evaluate $\int_C (z^2 + 3z)dz$

   (a) along the circle $|z| = 2$ from $(2,0)$ to $(0,2)$ in a counter clockwise direction.

   (b) the straight line from $(2,0)$ to $(2,2)$ and then from $(2,2)$ to $(0,2)$.

6. Evaluate $\int_i^{2-i} (3xy + iy^2)dz$

   (a) along the straight line joining $z = i$ and $z = 2 - i$

   (b) along the parabola $x = 2t - 2$, $y = 1 + t - t^2$.

7. Evaluate $\oint_C (\bar{z})^2\,dz$ around the circles (a) $|z| = 1$ and (b) $|z - 1| = 1$.

8. Evaluate $\oint_C \frac{dz}{z-2}$ around the circle $|z - 2| = 4$.

9. Evaluate $\oint_C (5z^4 - z^3 + 2)\,dz$ around the circle $|z| = 1$.