

MNS Department
Fall Semester 2024
Course Title: Mathematics for Machine learning and Signal Processing
Course ID: MAT 215
Assignment #2
Section: 4

Lecture Modules: Complex Integrals

- Complex Integration
 - Basic theorems related to Contour Integration.
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0.1 Questions

1. Evaluate: $\int_i^{2-i} (3xy + iy^2) dz$ (a) along the straight line joining $z = i$ and $z = 2 - i$ (b) along the curve $x = 2t - 2, y = 1 + t - t^2$
2. Evaluate: $\frac{1}{2\pi i} \oint_C \frac{e^{zt}}{(z^2 + 1)^2} dz$
3. Evaluate: $\oint_C \frac{1}{(z - 2)^3} dz$ around the square with vertices at $2 \pm 2i, -2 \pm 2i$
4. Evaluate: $\oint_C \frac{e^{3z}}{(z - \pi i)} dz$ around the ellipse $|z - 2| + |z + 2| = 6$
5. Expand $f(z) = \frac{z}{(z - 1)(2 - z)}$ in a Laurent series valid for $0 < |z - 2| < 1$