

### Homework 3, Math 804 Tanveer

Due date: Wednesday, 28 October, 2009

1. Determine  $\oint_{|z|=2} \frac{z}{\sin^3 z} dz$ .

2. Use contour integration to evaluate  $\int_0^\infty \frac{\ln x}{1+x^2} dx$ .

3. Use contour integration to determine the Taylor series coefficient about  $z = 0$  of  $J(z)$  defined by

$$J(z) = \int_0^\pi e^{z \cos \theta} d\theta$$

4. For  $a > b > 0$ , use contour integration to evaluate

$$\int_0^{2\pi} \ln [a + b \cos \theta] d\theta$$

5. For  $-\pi < \alpha < \pi$ , evaluate  $\int_0^\infty \frac{\sin \alpha x}{\sinh \pi x} dx$ .