

185B Homework 1

Due Friday April 6

Question 1 Compute

$$I = \int_0^{2\pi} \frac{d\theta}{13 - 12 \cos \theta},$$

$$I = \int_0^{2\pi} e^{k \cos \theta} \cos(k \sin \theta) d\theta.$$

Question 2 Compute

$$I = \int_0^\infty \frac{1 + x^2}{1 + x^4} dx,$$

$$I = \int_0^\infty \frac{\cos x}{4 + x^2} dx,$$

$$I = \int_0^\infty \frac{\cos mx}{1 + x^2 + x^4} dx, \quad (m > 0).$$

Question 3 Use a rectangular contour to show that

$$\int_{-\infty}^\infty \frac{e^{ax} dx}{\cosh x} = \frac{\pi}{\cos(\frac{1}{2}\pi a)} \quad (|a| < 1).$$

Question 4 Show

$$\int_{-\infty}^\infty \frac{dx \cos x}{\pi^2 - 4x^2} = \frac{1}{2}.$$

by closing the contour in the upper half plane and introducing small semi-circles on the real axis around $x = \pm\pi/2$.