

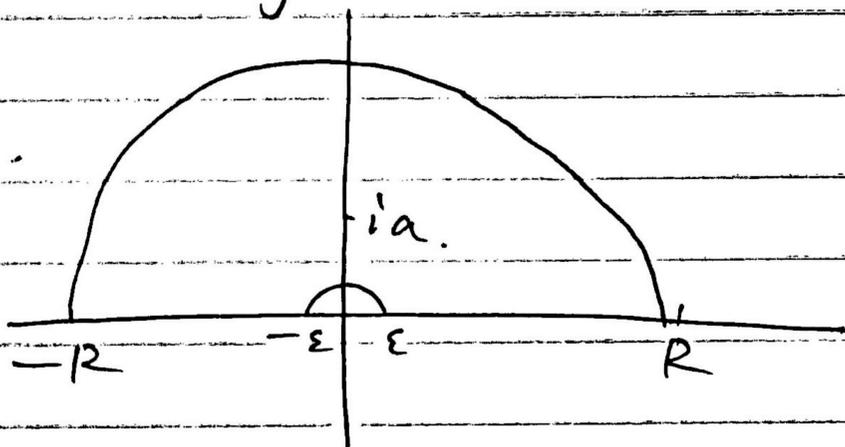
Tutorial 11. 23. Nov. 2015.

1. Prove that  $\int_0^{2\pi} \frac{d\theta}{(a + \cos\theta)^2} = \frac{2\pi a}{(a^2 - 1)^{3/2}}$  whenever  $a > 1$ ,  $a \in \mathbb{R}$ .

2. Show that if  $a > 0$ , then

$$\int_0^{\infty} \frac{\log x}{x^2 + a^2} dx = \frac{\pi}{2a} \log a.$$

Hint: Use the contour.



3. Show that if  $|a| < 1$ , then

$$\int_0^{2\pi} \log |1 - ae^{i\theta}| d\theta = 0.$$

4. Show that  $\int_0^1 \log(\sin \pi x) dx = -\log 2$ .

Hint: Use the contour

