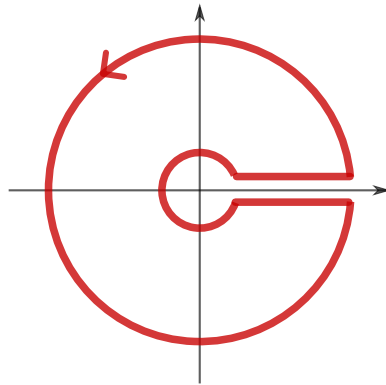


13. 12. 2016

# Mathematical Method of Physics

## Problem 3

3.1 Use the contour presented below,



to evaluate the integrals:

a)

$$\int_0^{+\infty} \frac{\ln x}{(x+a)^2 + b^2} dx \quad \text{for } a > 0.$$

$$\text{Hint: } f(z) = \frac{\ln^2 z}{(z+a)^2 + b^2}.$$

b)

$$\int_0^{+\infty} \frac{x^{1/4}}{1+x^2} dx.$$

3.2 Find the following integrals in terms of their principal values:

a)

$$\int_{-\infty}^{+\infty} \frac{1}{x(x^2+1)} dx,$$

b)

$$\int_0^{+\infty} \frac{1}{x^2 - a^2} dx.$$