

Math 501 Homework 6 Due Friday, October 24th

(1) For each of the following multiple-valued functions, locate all of the branch points, and describe a cut plane on which a single-valued branch of the function exists. Don't make unnecessary cuts; use as few as possible.

(a) $\sqrt{z^2 + 2z + 2}$;

(b) $\log(z^3 + 1)$;

(c) $((z - 1)/(z + 1))^{\frac{7}{11}}$.

(2) By contour integration find the value of

$$\int_0^{\infty} \frac{\sqrt{x}}{x^2 + 5x + 6} dx.$$

(3) Show that

$$\int_0^{\infty} \frac{\log x}{1 + x^4} dx = \frac{-\pi^2}{8\sqrt{2}}.$$