Math 122B Homework 1

Rad Mallari

April 6, 2022

1 Problem 1

Let $P(z)$ denote a polynomial of degree $d/geq1$. Define

$$M(r) = \sup_{|z|=r} |P(z)|, \quad r > 0$$

Show that both functions

$$r \mapsto M(r), \quad r \mapsto -r^{-d}M(r)$$

are strictly increasing
Proof.

□

2 Problem 2

Compute the integral

$$\int_{|z|=3} \sin(\frac{1}{z})dz$$

Proof.

□

3 Problem 3

(Correct statement). Let n be a positive integer and let $f(z)$ be an entire function satisfying the inequality $|f(z)| > |z|^n$, for $|z| > 1$. Prove that f is a polynomial
Proof.

□