Complex Analysis, Spring 2019

Grinshpan

Homework 7

due Wednesday, June 5

1. Adjust *the proof* of Cauchy's theorem for a triangle to the case of a parallelogram.

2. Let f and C be as in the statement of Cauchy's formula for a circle. What is the value of $\displaystyle\int_C \frac{f(\zeta)}{\zeta - z}\, d\zeta$ when z is in the exterior of C?

3. Evaluate the integral $\displaystyle\int_0^{2\pi} \frac{d\theta}{2 + \cos\theta}$.

4. Evaluate the integral $\displaystyle\frac{1}{2\pi i}\int_{|z|=1} e^z z^{-3}\, dz$.

5. Let f be an entire function such that $|f(z)| \le |z|^2$. Prove that $f(z) = cz^2$.