Problem Set 3B: Practice Problem Set 3

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MAT 342 – Applied Complex Analysis
Summer Session II 2019

NEVER DUE. Do the exercises for your own benefit. Practice makes perfect. On this note, keep in mind that the assignments are mostly for grading purposes and are thus not enough practice. If you have any questions, let me know.

Exercise 0. Review everything you've studied this week before proceeding!

Exercise 1. Evaluate $\displaystyle\int_\gamma \left(z - \frac{1}{z}\right) dz$ where γ is the straight-line path from 1 to i.

Exercise 2. Compute $\displaystyle\int_C |z|\, dz$ where C is the rectangle with corners $-1, 1, 1+i$ and $-1+i$.

Exercise 3. Show that

$$\left| \int_{\{|z|=1\}} \frac{2z+1}{5+z^2} dz \right| \leq \frac{3\pi}{2}.$$

Exercise 4. Find the maximum and minimum values of the function $f(z) = \big|z(1-z)\big|$ on the disk $\{|z| \leq 1\}$.

Exercise 5. Let $f(x+iy) = u(x,y) + iv(x,y)$ be holomorphic on a region $A \subset \mathbb{C}$. Which of the following are also holomorphic?

- $f_1(x+iy) = u(x,y) - iv(x,y)$,
- $f_2(x+iy) = -u(x,y) - iv(x,y)$,
- $f_3(x+iy) = iu(x,y) - v(x,y)$.