Math 300: Assignment #6:
Due: Friday, Oct. 30. in class.

1. Parametrize the contour consisting of straight line segments $1 \rightarrow i \rightarrow -1 \rightarrow -i \rightarrow 1$ in the interval $0 \leq t \leq 4$. (Read Section 4.1, problem 7 solution for a similar contour.)

2. Section 4.1: 8. Use the interval $0 \leq t \leq 2$ in both cases.

3. Section 4.1: 9. Read the solution and parametrize the opposite contour starting at 1 and ending at -1, with $0 \leq t \leq 3$

4. Sketch the curve
   
   \[ z(t) = e^{(-1+i)t}, \quad 0 \leq t \leq b, \]
   
   where $b > 0$ is some large number and find its length. Does the length converge to a finite number as $b \to \infty$?

5. Section 4.2: 6.

6. Let
   
   \[ f(z) = \frac{z + 1}{z}. \]
   
   Compute $\int_{\Gamma} f(z)dz$ for each of the following directed smooth arcs $\Gamma$.
   a. The semi-circle in the upper half-plane, centered at 0, with radius 1, in the clockwise direction.
   b. The semi-circle in the lower half-plane, centered at 0, with radius 1, in the clockwise direction.
   c. The circle, centered at 0, with radius 1, in the clockwise direction.
   d. The circle, centered at 0, with radius 1, in the counter-clockwise direction.

7. Section 4.2: 14(a,b).

8. Find the integral
   
   \[ \int_{\Gamma} \text{Log}(z)dz \]
   
   where $\Gamma$ is the semi-circle of radius 1 and center 0 from $-i$ to $i$ in the counter-clockwise direction.