Math 555 — Fall 2016 — Homework Assignment 9 — Due Thursday, November 17

(1) (Thursday?) Page 167, Problem 2.
(2) (Friday?) Page 167, Problem 3.
(3) (Saturday?) Page 168, Problem 6.
(4) (Sunday?) Page 168, Problem 8.
(5) (Monday?) Page 168, Problem 9.
(6) (Tuesday?) Page 169, Problem 21(c,d).
(7) (Wednesday?) Suppose that $f(z)$ is known to be an analytic function on and within some piecewise-smooth, closed Jordan curve C, taken with positive orientation, that f doesn't vanish anywhere on C, and that

$$\oint_C \frac{f'(z)}{f(z)}\,dz = 4\pi i.$$

Explain how to find all of the zeros of $f(z)$ in the interior of C if in addition you know the values I_1 and I_2 of these integrals:

$$I_1 := \oint_C z\frac{f'(z)}{f(z)}\,dz \quad \text{and} \quad I_2 := \oint_C z^2\frac{f'(z)}{f(z)}\,dz.$$

In other words, explicitly express these zeros of f in terms of the given information. This procedure is a computationally effective way to find roots of some analytic functions in the complex plane.