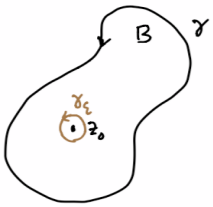
Math 4200-001
Week 7-8 concepts and homework
2.4
Due Friday October 16 at 11:59 p.m.

2.4 2, 3, 5, 7, 8, 12, 16, 17, 18. Hint: In problems 2, 5, 18 identify the contour integrals as expressing a certain function or one of its derivatives, at a point inside γ, via the Cauchy integral formulas for analytic functions and their derivatives.

w7.1 Prove the special case of the Cauchy integral formula that we discuss on Wednesday, in Monday's notes:

If γ is a counter-clockwise simple closed curve bounding a subdomain B in A, with z_0 inside γ, then the important special case of the Cauchy integral formula can be proven with contour replacement and a limiting argument, assuming f is C^1 in addition to being analytic:

$$f(z_0) = \frac{1}{2\pi i}\int_{\gamma} \frac{f(z)}{z - z_0}\, dz.$$



w7.2 Prove the positive distance lemma, which we make much use of in proving various theorems: If $K \subseteq \mathbb{C}$ is compact, and if $K \subseteq O$, where O is open, then there exists an $\varepsilon > 0$ such that for each $z \in K$, $D(z;\varepsilon) \subseteq O$. (This is equivalent to Distance Lemma 1.4.21 in the text. See if you can find a proof without looking there first, but in any case write a proof in your own words.)