Math 4200-001
Week 2 concepts and homework
1.5
Due Friday September 11 at 5:00 p.m.

1.5 1ad, 3b, 5c, 6c (in 5c and 6c describe the differential map as a rotation-dilation); 8, 9, 10, 11, 16, 18abc, 19.

w2.1a) Done as quiz 3 so canceled: Consider $f(z) = \frac{1}{z}$ and $z_0 = \frac{1+i}{2}$. Illustrate the rotation-dilation differential map for f at z_0 using rectangular coordinates. Precisely, Sketch a domain picture containing the point z_0 along with real and imaginary coordinate segments through that point having unit tangent vectors 1 and i. Sketch a range picture containing $f(1+i)$, the images of the coordinate segments with the corresponding image tangent vectors based at $f(z_0)$ - which should be rotated and dilated according to the argument and absolute value of $f'(z_0)$.

w2.1b) Repeat part (a), except using polar form. In other words, for $f(r\,e^{i\theta})$, $r_0 = \frac{1}{\sqrt{2}}$, $\theta_0 = \frac{\pi}{4}$, sketch r and θ coordinate segments through z_0 and their tangent vectors. In the range picture sketch the images of these coordinate segments and the corresponding rotated and dilated image tangent vectors.

In the problem above you are creating concrete realizations of the schematic pictures Figures 1.5.1 and 1.5.2 in the text.