Math 4200-001
Week 1 concepts and homework
1.1-1.3
Due Wednesday September 2, at start of class.

1) On the history of complex numbers: There is what looks to be a very nice series of videos for a complex analysis course which intersects our own. The class was created by Dr. Petra Bonfert-Taylor and the first lecture talks about the origins - one could work formally with a symbol whose square was -1, in order to find at least on real root to every cubic equation. Nothing to hand in here, but you might decide you want to watch some more of those videos as a supplement to our class at appropriate times.
https://www.youtube.com/c/PetraBonfertTaylor/playlists

Text problems: There are example exercises at the end of each section which I recommend looking over before you try the homework. Odd answers are in the back of the text.

1.1 1b, 2c, 4ab, 6a, 10, 11 (just check the distributive law), 14, 17a.

1.2 1a, 2b, 4, 5, 8, 11, 14, 19.

1.3 1a, 4b, 5a, 6a, 7a, 8a, 10, 21, 23, 30b.

w1.1 Sketch the following subsets of the complex plane. Use shading and labeling to clearly specify the subset.

a) $\{z \in \mathbb{C} \mid 1 \leq \mathrm{Re}(z) < 3\,,\, 0 < \mathrm{Im}(z) < 2\}$.

b) $\left\{ z \in \mathbb{C} \;\middle|\; |z| \leq 2, 0 < arg(z) < \frac{\pi}{2} \right\}$

c) The image of the sector in b), under the transformation $f(z) = z^3$.

w1.2 Sketch the following subsets of the complex plane, as above.

a) $\left\{ z \in \mathbb{C} \;\middle|\; -\frac{\pi}{4} \leq \mathrm{Im}(z) \leq \frac{\pi}{4} \right\}$

b) The image of the strip in a), under the transformation $f(z) = e^z$.

c) The image of the right half plane $\{z \in \mathbb{C} \mid \mathrm{Re}(z) > 0\}$ under the transformation $g(z) = \log(z)$, where $arg(1)$ is chosen to be 2π.