# Homework 1

Homework problems should be returned to Moodle for grading.

**Homework 1:** Sketch a picture of the following sets:

(a) $\{z \in \mathbb{C} : \operatorname{Im} z < -1\}$,

(b) $\{z \in \mathbb{C} \setminus \{0\} : |\operatorname{Arg} z| \geq \pi/4\} \cup \{0\}$,

(c) $\{z \in \mathbb{C} : r \leq |z - a| < s\}$, where $a \in \mathbb{C}$ and $0 < r < s < \infty$ are constants.

Are these sets open, closed, or neither? Explain your answers.

**Homework 2:** (a) Write the following complex numbers in the polar form $z = re^{i\theta}$:

$$z_1 = -7, \qquad z_2 = \frac{2+2i}{1-i}.$$

(b) Express $\operatorname{Log}(2 - 3i)$ in the Cartesian form $z = x + iy$.

**Homework 3:** Find and plot all complex solutions of the equation $z^3 - (4 + 4\sqrt{3}i) = 0$.

**Homework 4:** Use De Moivre's formula to evaluate $(\sqrt{3} - i)^6$.