Instructions: Complete all problems from the list below. This assignment will be due on Gradescope no later than **7pm on Wednesday, November 2nd**. Late work will not be accepted. There will be no exceptions for technology issues, so I suggest you upload your homework at least one hour before the deadline. Please make sure you've done all of the following before submitting your work:

* **Do not** write your name anywhere on your submission. Gradescope will keep track of your submission, and will allow me to use a blind grading process.
* Type your homework using LaTeX.
* Write up proofs formally and completely.
* If you use any resources (stackexchange, tutors, friends), please include a list of references in your writeup.

Chapter 5 Problems:

1. Show that the minimal polynomial $m_\alpha(X)$ of an algebraic number α is unique. *(Hint: use the division algorithm in* $\mathbb{Q}[X]$*)*

3. Show that the following complex numbers are algebraic. Determine which are algebraic integers. (Bonus: also find their minimal polynomials).

   a) $(1+i)/\sqrt{2}$
   b) $i+\sqrt{2}$
   c) $e^{2\pi i/3}+2$
   d) $\sqrt{1+\sqrt{2}}+\sqrt{1-\sqrt{2}}$

4. Show that the set of algebraic numbers $\bar{\mathbb{Z}}$ is countable. Conclude that there exists infinitely many transcendental numbers.

5. Let $K=\mathbb{Q}(\sqrt{2},\sqrt[3]{2})$. Find all monomorphisms $K \hookrightarrow \mathbb{C}$ that fix $\mathbb{Q}$.