

3450:438/538:001 **Homework 1** Fall 2007

Course: Advanced Engineering Math I

Instructor: Dr. Laura Gross

Recommended deadline: Wednesday, August 29, 2007

THIS HOMEWORK IS NOT FOR COURSE CREDIT. However, you need to do problems to learn the material. Also, about 1/3 of your exam will consist of recommended homework problems.

Each answer must use **exact values**. (Do not give only decimal approximations to answers.) Show your work. Recall you can check many of your answers using the complex-variables capabilities of your graphing calculator.

1. Write the numbers in the form $a + bi$.

(a) $\frac{(8 + 2i) - (1 - i)}{(2 + i)^2}$

(b) $\left[\frac{2 + i}{6i - (1 - 2i)} \right]^2$

(c) $(2 + i)(-1 - i)(3 - 2i)$

2. Verify by substitution that $-1 + i$ and $-1 - i$ are solutions to $x^3 - 2x - 4 = 0$.

3. Write the complex equation $z^3 = 1$ as two real equations.

4. Write the system of two complex equations $z^3 + v^2 = 4i$, $v - 2i + 3 = 0$ as four real equations.

5. Prove $\Re(iz) = -\Im(z)$ for all complex numbers z . (Hint: Write z as $x + iy$.)

6. Briefly explain why $z_1 < z_2$ is not a meaningful statement for $z_1, z_2 \in \mathbb{C}$.