Complex Quick Reference and Implementation
Hints

CS 102, U of C, Spring 2006

- Negation. The negation of $a + bi$ is $-a - bi$.
- Conjugation. The conjugate of $a + bi$, denoted $a - bi$, is $a - bi$.
- Reciprocation. The reciprocal of $a + bi$ is
  $$
  \frac{a}{a^2 + b^2} + \frac{-b}{a^2 + b^2}i
  $$
- The modulus of $a + bi$ is $\sqrt{a^2 + b^2}$.
- Addition. Use addition and negation.
  $$(a_1 + b_1i) + (a_2 + b_2i) = (a_1 + a_2) + (b_1 + b_2)i$$
- Subtraction. Use addition and negation.
- Multiplication.
  $$(a_1 + b_1i)(a_2 + b_2i) = (a_1a_2 - b_1b_2) + (a_1b_2 + a_2b_1)i$$
- Division. Use multiplication and reciprocation.
- Exponentiation. Any complex number to the 0 is 1.
  For any positive power $p$,
  $$(a + bi)^p = (a + bi) \cdot (a + bi)^{p-1}$$
  For any negative power $p$, where $p = -k$ for some positive $k$,
  $$(a + bi)^{-k} = \frac{1}{(a + bi)^k}$$