V63.0005.002, Spring 2002
Mathematical Thinking
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Quiz 6

Answer all questions on this paper or on a separate sheet. Show your work wherever appropriate.

You may find the quadratic formula useful:

$$ax^2 + bx + c = 0 \quad \Leftrightarrow \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. Rewrite the equation $x^2 = -4x + 7$ in the form $(x + c)^2 = k$ with appropriate constants c and k. (Don't bother to solve the equation.)

2. Suppose I tell you that one solution to a certain quadratic equation is $3 - 2i$. What's the other solution?

3. Consider the equation $2x^2 - 4x = k$, where k is some given constant.

   (a) Solve for x in the case where $k = 4$.

   (b) Depending on the value chosen for k, there may be either 0, 1 or 2 *real* solutions for x; you can see this by looking at the quadratic formula. There are always complex solutions, but assume in this problem we're only interested in solutions that are real numbers. Find all possible (real) values of k we could choose so that the equation has

      i. Two real solutions,

      ii. One real solution,

      iii. No real solutions.