**Problem 1.** Make a square grid and find points that generate integral right triangles that are *good* approximations to 22.5 degree triangles and use them to generate Pythagorean triangles that are approximations to 45 degree triangles.

**Problem 2.** Consider the sequence where $p_{n+1} = q_n$, $q_{n+1} = 2q_n + p_n$, and $p_1 = 1$, $q_1 = 2$. Calculate the first few terms of the corresponding Pythagorean triple (by squaring the complex number). See if you can make some conjectures.

**Problem 3.** Solve the conjectures.

**Problem 4.** Find $\sqrt{2}i$ in the Gaussian integers.

**Problem 5.** If $a + bi$ is a Gaussian integer, where $a$ and $b$ are both odd, it always has a Gaussian integer as a factor over the Gaussian integers (other than 1, $-1$, $i$ or $-i$). What is it?

**Problem 6.** If $a$ and $b$ are relatively prime odd integers, show that $(a^2 - b^2)/2$ and $ab$ are relatively prime integers.