Book problems:

page 263: 1, 2, 5.

A. Compute $\gcd(2 + 3i, 2 - 3i)$. Show that in general, if $\alpha = a + bi$ is prime, then so is $\overline{\alpha} = a - bi$.

B. Compute $\gcd(9 + 7i, 13)$. Use the answer to find a solution to $x^2 + y^2 = 13$.

C. Show that if a prime $\pi = a + bi \in \mathbb{Z}[i]$ divides $N \in \mathbb{Z}$, then $\overline{\pi} = a - bi$ also divides $N$, and therefore so does $(a + bi)(a - bi) = a^2 + b^2$.

D. Find all integer solutions to $x^2 + y^2 = 41$ by the following method.

(1) Find $0 < x < 41$ such that $1 + x^2$ is a multiple of 41.
(2) Find $\gcd(1 + ix, 41)$ where $x$ is the solution you found in part (1).