Due Wednesday, November 17 at the beginning of class. All chapter and exercise numbers refer to Silverman's *A Friendly Introduction to Number Theory*, 4th edition.

(1) Ex. 24.2

(2) Ex. 24.4(b)

(3) Ex. 24.5

(4) Ex. 24.6

(5) Fix an integer $n \geq 1$. Suppose $A_1 = x_1^2 + ny_1^2$ and $A_2 = x_2^2 + ny_2^2$ with $x_1, x_2, y_1, y_2 \in \mathbb{Z}$.

   (a) Use matrix determinants to show that the product A_1A_2 is also of the form $x^2 + ny^2$ for some $x, y \in \mathbb{Z}$.

   (b) Use the magnitude of complex numbers to show that the product A_1A_2 is also of the form $x^2 + ny^2$ for some $x, y \in \mathbb{Z}$.

(6) Suppose $n = a^2 + b^2$ and $\gcd(a, b) = 1$. Suppose p is an odd prime that divides n. Prove that $p \equiv 1 \bmod 4$.

(7) ~~Ex. 35.6~~

(8) ~~Ex. 35.8~~