

Mathematics 361: Number Theory
Assignment F

Reading: Ireland and Rosen, Chapter 6 (including the exercises) and into Chapter 7

Problems:

Ireland and Rosen, Exercises 6.2; 6.4, 6.5; 6.11, 6.12, 6.13, 6.14; 6.23, 6.18; 6.19 (note that $\cos(2\pi/5) = (\zeta_5 + \zeta_5^{-1})/2$ where $\zeta_5 = e^{2\pi i/5}$ and that the polynomial of ζ_5 is $1 + X + X^2 + X^3 + X^4$).

Some of these exercises may be facilitated by invoking or first establishing the following two results:

- Given a nonzero polynomial f with rational coefficients, there exists a unique positive rational number r such that rf has integral coefficients with greatest common divisor 1.
- Granting the result of exercise 6.4, if a nonzero integral polynomial $g(X) \in \mathbb{Z}[X]$ factors in $\mathbb{Q}[X]$ then it factors in $\mathbb{Z}[X]$.