

Math 112
Assignment 3
Due Wed Mar 5

1. Stewart exercises 3.5-3.8
2. In this exercise we give various proofs that $\sqrt{2}$ is irrational.
 - (a) Show that $\sqrt{2}$ is rational if and only if $x^2 - 2$ is reducible over \mathbb{Q} .
[Hint: For the “only if” part, use Stewart Lemma 3.25]
 - (b) Give three different proofs that $x^2 - 2$ is irreducible over \mathbb{Q} using each of the following:
 - i. Gauss’s Lemma (Stewart Lemma 3.17).
 - ii. Eisenstein’s Criterion (Stewart Theorem 3.19).
 - iii. Reduction mod p (Stewart Section 3.5).
3. Stewart exercises 4.2, 4.3(a)-(e), 4.6