

Math 317 Section B1 Quiz 11 (with solutions)

April 26, 2002

Problem 1.

Let $f(x) = 2x^2 - 6$.

- (1) Write the unique factorization of $f(x)$ in $\mathbb{Q}[x]$.
- (2) Write the unique factorization of $f(x)$ in $\mathbb{R}[x]$.

Solution.

(1) Since $f(x) \in \mathbb{Q}[x]$ has degree two and does not have roots in \mathbb{Q} , the polynomial $f(x)$ is irreducible in $\mathbb{Q}[x]$. Hence the unique factorization of $f(x)$ in $\mathbb{Q}[x]$ is:

$$f(x) = 2(x^2 - 3).$$

(2) The unique factorization of $f(x)$ in $\mathbb{R}[x]$ is:

$$f(x) = 2(x - \sqrt{3})(x + \sqrt{3}).$$