Assignment 10

MA08 Applied Algebra Deadline 05:00 PM, Wednesday, 20190731

1. Show that the given number $\tau \in \mathbb{C}$ is algebraic over $\mathbb{Q}$ by finding $f(x) \in \mathbb{Q}[x]$ such that $f(\tau) = 0$. (Hint: Example 12.2)
   (a) $1 + \sqrt{2}$
   (b) $1 + i$
   (c) $\sqrt{\sqrt[3]{2} - i}$
2. Find $\text{irr}(\tau, \mathbb{Q})$ and $\deg(\tau, \mathbb{Q})$ for the given algebraic number $\tau \in \mathbb{C}$.
   (a) $\sqrt{3 - \sqrt{6}}$
   (b) $\sqrt{2} + i$
3. Classify the given $\tau \in \mathbb{C}$ as algebraic or transcendental over the given field F. If τ is algebraic over F, find $\deg(\tau, F)$.
   (a) $\tau = i, F = \mathbb{Q}$
   (b) $\tau = \sqrt{\pi}, F = \mathbb{Q}$
   (c) $\tau = \sqrt{\pi}, F = \mathbb{R}$

   Notice: Please write Your Name and Student ID when you submit.