

Single Choice 5

1. Let K be a field. Which of the following statements are true?
 - (a) Every algebraic extension L of K is a finite extension.
 - (b) Every finite extension L of K is an algebraic extension.
 - (c) The extension $\mathbb{Q}(\exp(2\pi i/1234)) : \mathbb{Q}$ is not algebraic.
 - (d) All of the above are false.

2. How many subfields F of $\mathbb{Q}(\sqrt[4]{3}, i)$ exist such that $[F : \mathbb{Q}] = 4$?
 - (a) ≥ 3
 - (b) 2
 - (c) 1
 - (d) 0

3. Which of the following fields are **not** subfields F of $\mathbb{Q}(\sqrt[4]{3}, i)$ such that $[F : \mathbb{Q}] = 2$?
 - (a) $\mathbb{Q}(i)$
 - (b) $\mathbb{Q}(i\sqrt{3})$
 - (c) $\mathbb{Q}(i + \sqrt{3})$
 - (d) $\mathbb{Q}(\sqrt{3})$

4. Which of the following statements are true?
 - (a) π is algebraic over $\mathbb{Q}(\pi^3)$
 - (b) The fields $\mathbb{Q}(\sqrt{3})$ and $\mathbb{Q}(\sqrt{5})$ are **not** isomorphic as fields.
 - (c) The fields $\mathbb{Q}(\sqrt[4]{3})$ and $\mathbb{Q}(i\sqrt[4]{3})$ are isomorphic as fields.
 - (d) All statements above are true.

5. Which of the following statements are false?
 - (a) $[\mathbb{Q}(\sqrt{3}, \sqrt{6}) : \mathbb{Q}] = 4$
 - (b) $[\mathbb{Q}(\sqrt{3} + \sqrt{7}) : \mathbb{Q}(\sqrt{3})] = 4$
 - (c) $\mathbb{Q}(\sqrt{3} + \sqrt{7}) = \mathbb{Q}(\sqrt{3}, \sqrt{7})$
 - (d) $[\mathbb{Q}(\sqrt{2}, \sqrt[3]{2}) : \mathbb{Q}] = 6$