# Single Choice 6

**1**. Which of the fields below are a splitting field of the polynomial $X^4 - 3$ over $\mathbb{Q}$?

(a) $\mathbb{Q}(\sqrt[4]{3}, i)$

(b) $\mathbb{Q}(\sqrt[4]{3}, i\sqrt[4]{3})$

(c) $\mathbb{Q}(\sqrt[4]{3}, i\sqrt[2]{3})$

(d) All of the above.

**2**. Let $K$ be a field. Which of the following statements is **false**?

(a) If $K$ has no proper algebraic extensions, then every non-constant polynomial $f \in K[X]$ has at least one root in $K$.

(b) If each irreducible polynomial $f \in K[X]$ is linear, then $K$ is algebraically closed.

(c) If $K_1$ and $K_2$ are algebraic closures of $K$, then $K_1$ and $K_2$ are isomorphic over $K$.

(d) If $K$ contains a subfield which is algebraically closed, then $K$ is algebraically closed as well.

**3**. Which field extension is normal?

(a) $\mathbb{F}_2(X) : \mathbb{F}_2(X^3)$

(b) $\mathbb{F}_5(X) : \mathbb{F}_5(X^5)$

(c) $\mathbb{Q}(\sqrt[4]{5}) : \mathbb{Q}$

(d) $\mathbb{R} : \mathbb{Q}$

**4**. The statement: *The field extension* $\mathbb{Q}(\sqrt{2 + \sqrt{2}}) : \mathbb{Q}$ *is normal,* is...

(a) true

(b) false

**5**. Over which field is the polynomial $X^3 + 1$ separable?

(a) $\mathbb{Q}$

(b) $\mathbb{R}$

(c) $\mathbb{F}_5$

(d) All of the above.