Single Choice 2

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1. In the ring $\mathbb{Z}[i]$, we have $\gcd(i, 1 - i, 5)$ is given by

   (a) 5

   (b) $1 - i$

   (c) 2

   (d) 1

2. Which of the following statements is wrong?

   (a) Each principal ideal domain is a unique factorization domain.

   (b) Each Euclidean ring is an integral domain.

   (c) Each Euclidean ring is a principal ideal domain.

   (d) Each unique factorization domain is a Euclidean ring.

3. Which of the following rings is **not** a principal ideal domain?

   (a) $\mathbb{R}[X]$

   (b) $\mathbb{Z}[X]$

   (c) $\mathbb{Z}[X]/(X^2 + 1)$

   (d) $\mathbb{R}$

4. Which of the following elements in $\mathbb{Z}[i]$ are irreducible?

   (a) $2 + i$

   (b) $1 + 3i$

   (c) $3 + i$

   (d) All of the above.

5. Let K be a field and let $K[t^2, t^3]$ be the subring of $K[t]$ generated by t^2 and t^3. Which of the following statements is true?

   (a) t^2 is irreducible in $K[t^2, t^3]$.

   (b) t^2 is prime in $K[t^2, t^3]$.

   (c) Every irreducible element is a prime element in $K[t^2, t^3]$.

   (d) All of the above.