Assignment 11

The due date for submitting this assignment has passed. Due on 2019-04-17, 23:59 IST.
As per our records you have not submitted this assignment.

1) In modular arithmetic $\mod n$, the set $\mathbb{Z}_n = \{0, 1, 2, ..., n-1\}$ under addition and multiplication is
   a. not a ring
   b. a commutative ring without identity
   c. a commutative ring with identity
   d. None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   c.

2) Consider the set $2\mathbb{Z}$ (i.e. the set of even integers), where $\mathbb{Z}$ denotes the set of all integers, under addition and multiplication. Determine which of the following statements is true.
   a. The algebraic structure is not a ring
   b. The algebraic structure is a commutative ring without identity
   c. The algebraic structure is a commutative ring with identity
   d. None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   b.
Consider the ring \( \mathbb{Z}_6 \), the integers modulo 6 under two binary operations addition (+) and multiplication (\( \cdot \)). Determine which of the following statements is true?

a. \(((0, 1, 3), +, \cdot)\) is a subring of \((\mathbb{Z}_5, +, \cdot)\)

b. \(((0, 2, 5), +, \cdot)\) is a subring of \((\mathbb{Z}_5, +, \cdot)\)

c. \(((0, 2, 4), +, \cdot)\) is a subring of \((\mathbb{Z}_6, +, \cdot)\)

d. \(((0, 3, 4), +, \cdot)\) is a subring of \((\mathbb{Z}_6, +, \cdot)\)

4) For each positive integer \( n \), consider the set \( n\mathbb{Z} = \{0, \pm n, \pm 2n, \pm 3n, \ldots\} \) and two binary operations addition and multiplication. Determine which of the following statements is true.

a. \( n\mathbb{Z} \) is not a ring

b. \( n\mathbb{Z} \) is not a subring of the set of integers \( \mathbb{Z} \)

c. \( n\mathbb{Z} \) is a subring of the set of integers \( \mathbb{Z} \)

d. None of the above

5) Consider the set of Gaussian integers \( \mathbb{Z}[i] = \{a + bi \mid a, b \in \mathbb{Z}\} \) and two binary operations addition and multiplication. Determine which of the following statements is true?

a. It is not a ring

b. It is a subring of the set of complex numbers \( \mathbb{C} \)

c. It is a subring of the set of integers \( \mathbb{Z} \)

d. None of the above
Which of the following statements is true?
   a. $842 \equiv 3 \pmod{7}$
   b. $842 \equiv 6 \pmod{9}$
   c. $842 \equiv 7 \pmod{11}$
   d. $842 \equiv 6 \pmod{11}$

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   d.

7) The set $S = \{0, \pm 4, \pm 8, \pm 12, \ldots\}$ under usual addition and multiplication is
   a. not a ring
   b. a commutative ring
   c. a commutative ring with identity
   d. None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   d.

8) Let the algebraic structure $(S, +, \cdot)$ be a ring. Which of the following statements is true?
   a. $(S, +)$ is an abelian group.
   b. $(S, +)$ is not an abelian group.
   c. $(S, \cdot)$ is not a semigroup.
   d. $(S, \cdot)$ is a semigroup, but $(S, +)$ is not an abelian group.

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   a.
Let the algebraic structure \((\mathbb{Z}, \oplus, \circ)\) be a ring where the binary operations are defined as \(x \oplus y = x + y - 1\) and \(x \circ y = x + y - xy\) \(\forall x, y \in \mathbb{Z}\). Which of the following statements is true?

a. The additive inverse of 7 is -6.

b. The additive inverse of 7 is -7.

c. The additive inverse of 7 is -9.

d. The additive inverse of 7 is -5.

No, the answer is incorrect.
Score: 0
Accepted Answers: 
d.

10)
Let the algebraic structure \((\mathbb{Z}, \oplus, \circ)\) be a ring where the binary operations are defined as \(a \oplus b = a + b - 1\) and \(a \circ b = a + b - ab\) \(\forall a, b \in \mathbb{Z}\). Which of the following statements is true?

a. The algebraic structure is not a commutative ring.

b. The algebraic structure is not a commutative ring with identity.

c. The algebraic structure is an integral domain.

d. The algebraic structure is not an integral domain.

No, the answer is incorrect.
Score: 0
Accepted Answers: 
d.

11) Which of the following statements is true?

a. \(-11 \mod 7 = 4\)

b. \(-15 \mod 7 = 1\)

c. \(-20 \mod 7 = 1\)

d. \(-30 \mod 7 = 2\)

No, the answer is incorrect.
Score: 0
Accepted Answers: 
c.

12)
Which of the following statements is true?

a. $31 \equiv -2 \ (mod\ 11)$

b. $21 \equiv 1 \ (mod\ 11)$

c. $41 \equiv 3 \ (mod\ 11)$

d. $51 \equiv -3 \ (mod\ 11)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

13) Which of the following statements is true?

a. $11^8 \equiv 8 \ (mod\ 13)$

b. $11^8 \equiv 7 \ (mod\ 13)$

c. $11^8 \equiv 7 \ (mod\ 13)$

d. $11^8 \equiv 8 \ (mod\ 13)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

14) In modular arithmetic $mod\ 16$, the multiplicative inverse of $15$ is

a. $13$

b. $14$

c. $15$

d. $11$

No, the answer is incorrect.
Score: 0

Accepted Answers:
c.