1. The Real Number System

1. Which one of the following statements is FALSE?
   (a) If \(a\) is a natural number, then \(a\) is a whole number.
   (b) Any whole number is also an integer.
   (c) Any integer is also a rational number.
   (d) The number zero \((0)\) is both rational and irrational.
   (e) Any irrational number is also a real number.

2. The multiplicative inverse of \((-0.75)\) is
   (a) \(\frac{1}{1}\)
   (b) \(\frac{4}{3}\)
   (c) \(\frac{3}{4}\)
   (d) \(\frac{4}{3}\)
   (e) \(-\frac{1}{4}\)

3. Which one of the following statements is TRUE?
   (a) Every irrational number is a real number.
   (b) The set of the whole numbers is closed under division.
   (c) \(6 + (4 + 5) = (4 + 5) + 6\) illustrates the associative property.
   (d) The set \(\{0, 1\}\) is closed under addition.
   (e) Each real number is either even or odd.

4. Which one of the following statements is FALSE?
   (a) The set of all nonzero rational numbers is closed under division.
   (b) The sum or product of two irrational numbers can be rational or irrational.
   (c) The set of irrational numbers does not contain a multiplication identity.
   (d) The set of irrational numbers is closed under subtraction.
   (e) The difference of two real numbers is also a real number.

5. Which one of the following statements is TRUE?
   (a) The set of irrational numbers is closed with respect to addition.
   (b) The set \(\{-1, 0, 1\}\) is closed with respect to multiplication.
   (c) If \(x\) is any integer and \(y\) is any irrational number, then \(x/y\) is irrational.
   (d) The distributive law states that: \((a + b) + c = a + (b + c)\).
   (e) Any irrational number has a terminating or repeating decimal expansion.

6. Which one of the following statements is TRUE?
   (a) Every even integer has an additive inverse.
   (b) Every rational number has a multiplicative inverse.
   (c) \(\pi = \frac{22}{7}\).
   (d) The distributive law states that \(a + b = b + a\).
   (e) The set \(\{0, -1\}\) is closed under addition.

7. Which one of the following statements is FALSE?
   (a) The set of irrational numbers is closed under addition.
   (b) \(1.252525\ldots\) is a rational number.
   (c) \(-\frac{\sqrt{2}}{3}\) is a rational number.
   (d) The multiplication inverse of any irrational number is irrational.
   (e) \(\frac{\sqrt{2}}{2}\) is an irrational number.

8. Which one of the following statements is FALSE?
   (a) The addition inverse of \((-a)\) is \((a)\) for any real number
   (b) \(ab + c = c + ba\) is true because of the commutative property for addition and multiplication.
   (c) The set of integers contains an identity element for addition and multiplication.
   (d) Every real number has a multiplication inverse.
   (e) The set of irrational numbers is not closed under addition and multiplication.

9. To prove that \([a + (-a)] \cdot b = b.0\), we use
   (a) the inverse property for addition and the commutative property for multiplication.
   (b) the identity property for addition and the property for zero.
   (c) the commutative property for addition only.
   (d) the definition for subtraction only.
   (e) the distributive property only.

10. If \(A = \{-\sqrt{9}, -\frac{2}{2}, -\frac{3}{16}, 0.67, \sqrt{8}, -\sqrt{100}\}\), then \(A\) has
    (a) one natural number.
    (b) four rational numbers.
    (c) six real numbers.
    (d) two integers.
    (e) two irrational numbers.

11. Let \(S\) be a set consisting of the squares of the positive integers, that is \(1, 4, 9, 16, \ldots\), then \(S\) is closed under
    (a) addition.
    (b) subtraction.
    (c) multiplication.
(d) division.
(e) addition and subtraction.

12. \( ax + ay = (x + y) a \) is true because of
   (a) the commutative property for multiplication only.
   (b) the distributive property only.
   (c) the commutative property for multiplication and the distributive property.
   (d) the commutative property for addition and the distributive property.
   (e) the commutative property for addition only.

13. The number 980.665 \( \times 10^{-2} \) written in scientific notation is
   (a) 0.980665 \( \times 10 \)
   (b) 0.0980665 \( \times 10^2 \)
   (c) 9.80665
   (d) 9806.5 \( \times 10^{-4} \)
   (e) 98.0665 \( \times 10^{-1} \)