Week 4-Assignment 4-MCQ

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2018-09-05, 23:59 IST.

1) The operation of reflection in the plane \( x - y \) denoted by \( \sigma_{xy} \) can be written as matrix representation in the form (when the basis is considered as \( \begin{pmatrix} x \\ y \\ z \end{pmatrix} \))

No, the answer is incorrect.

Score: 0

Accepted Answers:

\[
\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}
\]

Starting with a given representation \( D[g] \) of any element \( g \in G \), we can construct the representation \( T[g] \) of the group \( T \).
3) Consider a group $G = \{e, a, a^2, a^3\}$. What is the generator of $G$?

- $e$
- $a^2$
- $a^3$
- $a$

No, the answer is incorrect.
Score: 0
Accepted Answers:
- non-singular

4) If $g \in G$ is represented by a matrix $D(g)$, then in this representation, $g^{-1}$ can be represented by

- $D(g^{-1})/(\det D(g))$
- $D(g)/(\det D(g))$
- $D(g)$
- $D(g)^{-1}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
- $D[g]^{-1}$

5) The Coset Space $G/N$ formed using a normal subgroup $N$

- can be endowed with a group structure and is called the factor group.
- is the trivial subgroup of $G$.
- is a permutation Group.
- is a Symmetric Group.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- can be endowed with a group structure and is called the factor group.

6) Representation matrices can always be chosen to be
Orthogonal.
Unitary.
Orthogonal with determinant 1.
Unitary with determinant 1.

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

7) For a group element represented as \( \sigma_v = \frac{1}{2} \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \), the character is

- 1/2
- 1
- -1/2
- 0

No, the answer is incorrect.
Score: 0
Accepted Answers:
1/2

8) The 1s orbital of Hydrogen atom has the symmetry axis

- \( C_4 \)
- \( C_3 \)
- \( C_2 \)
- \( C_\infty \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( C_\infty \)

9) For an Abelian Group, which of the following statements is true? (where \( D[a] \) is a representation of element \( a \))

- \( D[a]D[b] = D[a - b] \)
- \( D[a]D[b] = D[a + b] \)
- \( D[a]D[b] = D[b]D[a] \)
- \( D[a^{-1}]D[b^{-1}] = D[b]D[a] \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
10. If \( D_1[a] = S^{-1}D_2[a]S \) for a nonsingular Unitary matrix \( S \) and for any \( a \in G \), then \( D_1 \) and \( D_2 \) are said to be

- Trivial Representation
- Equivalent Representation
- Faithful Representation
- Inequivalent Representation

No, the answer is incorrect.
Score: 0

Accepted Answers:
Equivalent Representation