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NPTEL

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Courses » Theory of groups for physics applications

Announcements **Course** Ask a Question Progress Mentor FAQ

Unit 12 - Week 11

Week 11-Assignment 11-MCQ

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-10-17, 23:59 IST.

1) The generators of the Lorentz Group treated as the real group $SO(3,1)$ are *1 point*

- all hermitian
- some skew-symmetric and some symmetric
- all unitary
- mostly orthogonal

No, the answer is incorrect.
Score: 0

Accepted Answers:
some skew-symmetric and some symmetric

2) A pseudovector can be distinguished from an ordinary vector by the operation of *1 point*

- Time Reversal
- Lorentz boost
- Space Inversion
- Spacetime Translation

No, the answer is incorrect.
Score: 0

Accepted Answers:
Space Inversion

3) Orthochronus Proper Lorentz transformation are characterised by, *1 point*

- $\Lambda^0_0 \geqslant 1, det\Lambda = 1$

Clifford Algebra-II

Quiz : Week 11-Assignment 11-MCQ

Week11-Lecture Slides and Reading Materials

Week11-Assignment11-Solutions

Week 12

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\Lambda^0_0 \geqslant 1, det\Lambda = 1$

4) With the definition $\gamma^5 \equiv i\gamma^0\gamma^1\gamma^2\gamma^3$, evaluate the anti-commutator : $\{\gamma^5, \gamma^\mu\}$ where $\mu = 0, 1, 2, 3$ (Metric convention diag(+,$-, -, -$)) **1 point**

- 0
- $2\eta^{5\mu}\mathbb{I}_{n\times n}$
- $-2\eta^{5\mu}\mathbb{I}_{n\times n}$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
0

5) For the irreps of $SO(3,1)$ written in the form (j_A, j_B), all particles that are unchanged under space inversion must have **1 point**

- $j_A - j_B = \frac{1}{2}$
- $j_A > j_B$
- $j_A < j_B$
- $j_A = j_B$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$j_A = j_B$

6) The 2×2 matrix form of $\mathbb{V} = V^0\mathbb{I} + \vec{V}.\vec{\tau}$ is **1 point**

- $\begin{pmatrix} V^0 - V^3 & V^1 - iV^2 \\ V^1 + iV^2 & V^0 + V^3 \end{pmatrix}$
- $\begin{pmatrix} V^0 + V^3 & V^1 + iV^2 \\ V^1 - iV^2 & V^0 - V^3 \end{pmatrix}$
- $\begin{pmatrix} V^0 + V^3 & V^1 - iV^2 \\ V^1 + iV^2 & V^0 - V^3 \end{pmatrix}$
- $\begin{pmatrix} V^0 + V^3 & V^1 + iV^2 \\ V^1 + iV^2 & V^0 + V^3 \end{pmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$$\begin{pmatrix} V^0+V^3 & V^1-iV^2 \\ V^1+iV^2 & V^0-V^3 \end{pmatrix}$$

7) Pick out the conditions imposed on γ matrices as per the convention used in class. ***1 point***

- $(\gamma^0)^\dagger = \gamma^0, (\gamma^i)^\dagger = \gamma^i$
- $(\gamma^0)^\dagger = \gamma^0, (\gamma^i)^\dagger = -\gamma^i$
- $(\gamma^0)^\dagger = -\gamma^0, (\gamma^i)^\dagger = -\gamma^i$
- $(\gamma^0)^\dagger = -\gamma^0, (\gamma^i)^\dagger = \gamma^i$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$(\gamma^0)^\dagger = \gamma^0, (\gamma^i)^\dagger = -\gamma^i$

8) The physical quantity that provides the generators of spacetime translations in 4 dimensions is ***1 point***

- the momentum 4-vector
- the Hamiltonian
- the orbital angular momentum
- spin angular momentum

No, the answer is incorrect.
Score: 0

Accepted Answers:
the momentum 4-vector

9) To build Clifford algebra for $SO(6)$ with metric $\mathbb{I}_{6\times 6}$, we need ***1 point***

- 2×2 matrices
- 4×4 matrices
- 6×6 matrices
- 8×8 matrices

No, the answer is incorrect.
Score: 0

Accepted Answers:
8×8 *matrices*

10)Evaluate Trace $(\gamma^\mu \gamma^\nu)$ where $\mu, \nu = 0, 1, 2, 3$ ***1 point***

- 0
- $2\eta^{\mu\nu}$
-

$-2\eta^{\mu\nu}$

$4\eta^{\mu\nu}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$4\eta^{\mu\nu}$

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