Unit 13 - Week 11

Assessment 11

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

Due on 2020-12-02, 23:59 IST.

1) The Coulomb gauge is defined by: *1 point*

- $\partial^\mu A_\mu = 0$
- $\partial^\mu \partial_\mu \Lambda = 0$
- $\phi = 0, \nabla \mathbf{A} = 0$
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\phi = 0, \nabla \mathbf{A} = 0$

2) The Lagrangian for the electromagnetic field can be put in the form: *1 point*

- $\mathcal{L} = \frac{1}{2} A^\mu \left(g_{\mu\nu} \Box - \partial_\mu \partial_\nu \right) A^\nu$
- $\mathcal{L} = \frac{1}{2} \left(g_{\mu\nu} \Box - \partial_\mu \partial_\nu \right) A^\nu$
- $\mathcal{L} = \frac{1}{2} A^\mu \left(g_{\mu\nu} \partial_\mu - \partial_\mu \partial_\nu \right)$
- $\mathcal{L} = \frac{1}{2} A^\mu \left(g_{\mu\nu} \Box + \partial_\mu \partial_\nu \right) A^\nu$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\mathcal{L} = \frac{1}{2} A^\mu \left(g_{\mu\nu} \Box - \partial_\mu \partial_\nu \right) A^\nu$

3) In terms of the electromagnetic field tensor $F^{\mu\nu}$, the Lagrangian for the electromagnetic field takes the functional form: *1 point*

- $\mathcal{L} = -\frac{1}{4} F^{\mu\nu} F_{\mu\nu}$
- $\mathcal{L} = -\frac{1}{4} \partial^\mu F_{\mu\nu}$
- $\mathcal{L} = F^{\mu\nu} F_{\mu\nu} + \Box A$
- $\mathcal{L} = F^{\mu\nu} + \nabla \times \mathbf{A}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\mathcal{L} = -\frac{1}{4} F^{\mu\nu} F_{\mu\nu}$

4) In the Lorenz gauge, the Lagrangian for the electromagnetic field may be written as: *1 point*

- $\mathcal{L} = \frac{1}{2} A^\mu g_{\mu\nu} \partial_\mu A^\mu$
- $\mathcal{L} = \frac{1}{2} g_{\mu\nu} \partial^\mu \partial_\mu A^\nu$
- $\mathcal{L} = \frac{1}{2} A^\mu g_{\mu\nu} A^\nu$
- $\mathcal{L} = \frac{1}{2} A^\mu g_{\mu\nu} \partial^\mu \partial_\mu A^\nu$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\mathcal{L} = \frac{1}{2} A^\mu g_{\mu\nu} \partial^\mu \partial_\mu A^\nu$

5) Suppose that a stock price, S, follows geometric Brownian motion with expected return μ and volatility σ i.e. $dS = \mu S dt + \sigma S dz$. The drift and diffusion coefficients in the Ito equation followed by the function $G \equiv S^n$ are respectively: *1 point*

- $\mu G + \frac{1}{2} n(n-1)(\sigma G)^2$ & σG
- $\mu n G + \frac{1}{2} n(n-1) \sigma^2 G$ & $\sigma n G$
- $\mu G + \frac{1}{2} n(n-1) \sigma^2 G$ & σG
- $\mu (\ln G) + \frac{1}{2} \sigma^2 (\ln G)^2$ & $\sigma (\ln G)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\mu n G + \frac{1}{2} n(n-1) \sigma^2 G$ & $\sigma n G$

6) Empirical studies in India have shown that the natural logarithm of the exchange rate for GBP in the Indian foreign currency spot markets i.e. ln S (where S is the spot exchange rate for GBP in terms of INR) is normally distributed with mean 3 and variance of 4. The probability that the spot exchange rate for GBP i.e. S lies between the values INR 35.9 and INR 97.5 is: *1 point*

- 0.1141
- 0.6711
- 0.1711
- 0.1007

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.1711

7) A company's cash position, measured in millions of dollars, follows a generalized Wiener process with a drift rate of 1.00 per quarter and a variance rate of 8.0 per quarter. The minimum initial cash position of the company (in millions) such that it has a less than 5% chance of a negative cash position by the end of one year is closest to: *1 point*

- 4.48
- 4.05
- 4.89
- 5.30

No, the answer is incorrect.
Score: 0
Accepted Answers:
5.30

8) Let G(S,t) = e^S where S is a Ito process given by $dS = \mu S dt + \sigma S dz$. The drift and diffusion coefficients in the Ito equation followed by the function G are respectively: *1 point*

- $\mu G + \frac{1}{2} \sigma^2 G$ & $\sigma G (\ln G)$
- $\mu (\ln G) + \frac{1}{2} \sigma^2 (\ln G)^2$ & $\sigma (\ln G)$
- $\mu G (\ln G) + \frac{1}{2} \sigma^2 G (\ln G)^2$ & $\sigma G (\ln G)$
- $\mu G (\ln S) + \frac{1}{2} \sigma^2 G (\ln S)^2$ & $\sigma G (\ln S)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\mu G (\ln G) + \frac{1}{2} \sigma^2 G (\ln G)^2$ & $\sigma G (\ln G)$

9) Let ln X (i.e. natural logarithm of X) be normally distributed with mean 1 and variance of 4. Then, the expected (MEAN) value of X is: *1 point*

- 3.00
- 20.09
- 1,000.00
- 2.72

No, the answer is incorrect.
Score: 0
Accepted Answers:
20.09

10) A stock's price follow a lognormal distribution with an expected rate of return of 14% and a volatility of 30% p.a. The stock pays dividends continuously at a rate of 2% p.a. The probability that the stock's price at the end of one month will be greater than its expected price at that time is closest to: *1 point*

- 0.484
- 0.408
- 0.422
- 0.412

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.484