

Unit 3 - Week 1

Course outline

How does an NPTEL online course work?

Practice Assignment

Week 1

- Lecture 1 : Why Study Statistical Mechanics?
- Lecture 2 : Thermodynamics
- Lecture 3 : Probability Theory Part 1
- Lecture 4 : Probability Theory Part 2
- Lecture 5 : Fundamental concepts and Postulates of Statistical Mechanics Part 1

 Quiz : Assignment 1

- Assignment-1 Solutions
- Weekly Feedback
- Download Videos

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

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Week 9

Week 10

Week 11

Week 12

Live Session

Text Transcripts

Assignment 1

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

Due on 2020-09-30, 23:59 IST.

1) The direction of a spontaneous process for a system at constant pressure (P) and temperature (T) is given by 1 point

- $d(U - TS + PV) \geq 0$
- $d(U - TP + VS) \leq 0$
- $d(U - TS + PV) \leq 0$
- $d(U - TP - VS) \geq 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$d(U - TS + PV) \leq 0$$

2) A box contains red and white marbles. Two marbles are chosen one by one, without replacement. The probability of selecting a red marble and then a white marble is x , and the probability of selecting a red marble on the first draw is y . The probability of selecting a white marble on the second draw, given that the first marble drawn was red is 1 point

- x/y
- y/x
- $x \cdot y$
- $x+y$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$x/y$$

3) Suppose you have n dice, each a different colour, all unbiased and 6-sided. Given 2 distinguishable dice, what is the probability of the most probable sum of their face values on a given throw of the pair? 1 point

- 2/3
- 7/36
- 1/36
- 1/6

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$1/6$$

4) If an unbiased green coin and an unbiased red coin are flipped 5 times each, what is the probability of getting 4 red heads and 2 green tails? 1 point

- 50/216
- 25/216
- 25/512
- 50/512

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$25/512$$

5) Three unbiased coins are tossed. The probability of getting at most two heads is 1 point

- 3/4
- 1/4
- 3/8
- 7/8

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$7/8$$

6) Time average of a dynamical quantity X is defined as 1 point

- $\bar{X} = \lim_{\tau \rightarrow \infty} \frac{1}{\tau} \int_{t_0}^{t_0 + \tau} ds X(s)$
- $\bar{X} = \lim_{\tau \rightarrow \infty} \frac{1}{\tau} \int_{t_0}^{t_0 + \tau} ds X(s)$
- $\bar{X} = \lim_{\tau \rightarrow 0} \frac{1}{\tau} \int_{t_0}^{t_0 + \tau} ds X(s)$
- $\bar{X} = \lim_{\tau \rightarrow \infty} \frac{1}{\tau} \int_{t_0}^{t_0 + \tau} ds < X(s) >$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\bar{X} = \lim_{\tau \rightarrow \infty} \frac{1}{\tau} \int_{t_0}^{t_0 + \tau} ds X(s)$$

7) The entropy of the universe, for a reversible process, remains constant. 1 point

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:

True

8) For a system being separated from its surrounding by an impermeable diathermal rigid wall, the state of the system can be completely defined in terms of the following three variables: 1 point

- T, P, N
- T, V, N
- U, V, N
- S, V, N

No, the answer is incorrect.
Score: 0

Accepted Answers:

T, V, N

9) A box contains 2 white, 3 red and 2 purple balls. Two balls are drawn at random. What is the probability that none of the balls drawn is purple? 1 point

- 10/21
- 11/21
- 2/7
- 5/7

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$10/21$$

10) Consider two systems with equal heat capacities (C) have initial temperatures T_{10} and T_{20} with $T_{20} > T_{10}$. An engine is to be designed to lift an elevator drawing energy from two thermodynamic systems. The maximum work that can be extracted from the engine is 1 point

- $W = C(T_{10} + T_{20} - 2\sqrt{T_{10}T_{20}})$
- $W = C(T_{10} + T_{20} - \sqrt{T_{10}T_{20}})$
- $W = C(T_{10} + T_{20})$
- $W = (T_{10} + T_{20} - \sqrt{T_{10}T_{20}} + C)$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$W = C(T_{10} + T_{20} - 2\sqrt{T_{10}T_{20}})$$