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NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Measure Theory (course)

Announcements (announcements)

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Unit 4 - Outer measure

Week 3 Assessment

The due date for submitting this assignment has passed. **Due on 2020-02-19, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Let F be a countable subset of $\mathbb{R}^n$ then $m_*(F)$ equals *1 point*

- [ ] 0
- [ ] ∞
- [ ] Any positive number

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

2) Which of the following are correct? *1 point*

- [ ] Any countable set is measurable
- [ ] Any open set is measurable
- [ ] The set $\{x \in \mathbb{R} : |e^x \sin x| > 1\}$ is measurable

No, the answer is incorrect.
Score: 0
Accepted Answers:
Any countable set is measurable
Any open set is measurable
The set $\{x \in \mathbb{R} : |e^x \sin x| > 1\}$ *is measurable*

3) Which of the following sets are Borel sets? *1 point*

on R^n (unit?unit=30&lesson=34)

Lebesgue measurable sets and Lebesgue measure on R^n (unit?unit=30&lesson=35)

Quiz : Week 3 Assessment (assessment?name=95)

Lebesgue measure and its properties

Lebesgue measure and positive Borel measures on locally compact spaces

Lebesgue measure and invariance properties

L^p spaces and completeness

Product spaces and Fubini's theorem

Applications of Fubini's theorem and complex measures

Complex measures and Radon-Nikodym theorem

Radon-Nikodym theorem and applications

Riesz representation theorem and Lebesgue differentiation theorem

- [ ] The subset of $[0, 1]$ whose decimal expansions starts with 2
- [ ] Subsets of $\mathbb{R}$ whose complements are countable

No, the answer is incorrect.
Score: 0
Accepted Answers:
The subset of $[0, 1]$ whose decimal expansions starts with 2
Subsets of $\mathbb{R}$ whose complements are countable

4) The outer measure of the set $\{0\} \times [-1, 1] \subset \mathbb{R}^2$ is **1 point**

- [ ] 0
- [ ] 1
- [ ] 2

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

5) Let $E \subset \mathbb{R}^n$ be an unbounded set. **1 point**

- [ ] Outer measure of E is infinity
- [ ] Outer measure of E is positive, but need not be infinity always
- [ ] There are unbounded sets whose outer measure is zero

No, the answer is incorrect.
Score: 0
Accepted Answers:
There are unbounded sets whose outer measure is zero

6) Let $E \subset \mathbb{R}^n$ be such that $m_*(E) = 0$. Let O_k be the open set $O_k = \{y \in \mathbb{R}^n : \ d(y, E) < \frac{1}{k}\}$ where $d(y, E) = \inf_{x \in E} |x - y|$. **1 point**

- [ ] $m_*(O_k) = \infty$ always
- [ ] $m_*(O_k)$ is finite always
- [ ] $m_*(O_k)$ is positive always

No, the answer is incorrect.
Score: 0
Accepted Answers:
$m_*(O_k)$ is positive always

7) Let $E \subset \mathbb{R}^n$ be such that $m_*(E) = 0$ and Let O_k be the open set $O_k = \{y \in \mathbb{R}^n : \ d(y, E) < \frac{1}{k}\}$ where $d(y, E) = \inf_{x \in E} |x - y|$. Then the statement $m_*(O_k) \to 0$ is **1 point**

- [ ] True always
- [ ] True if E is closed
- [ ] True if E is bounded
- [ ]

Weekly Feedback forms

Video download

True if E is compact

No, the answer is incorrect.
Score: 0

Accepted Answers:
True if E is compact

8) Let $E \subset \mathbb{R}^n$ and $x \in \mathbb{R}^n$. Define $E + x = \{y + x : \ y \in E\}$. Suppose $m_*(E) = 0$. Which of the following are correct? ***1 point***

- $m_*(E + x) = 0.$
- $E + x$ is measurable
- $E + x$ need not be measurable

No, the answer is incorrect.
Score: 0

Accepted Answers:
$m_*(E + x) = 0.$
$E + x$ is measurable

9) Let $A_n = \{n\} \times [-n, n] \subset \mathbb{R}^2$. If $A = \cup_{n=1}^{\infty} A_n$, then ***1 point***

- $m_*(A) = 0$
- $m_*(A) = \infty$
- $0 < m_*(A) < \infty$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$m_*(A) = 0$

10) Let $A = [0, 1]$. Which of the following are correct? ***1 point***

- $m_*(A) = \inf\{m_*(O) : A \subset O, O \text{ open } \}$
- $m_*(A) = \sup\{m_*(K) : K \subset A, K \text{ compact } \}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$m_*(A) = \inf\{m_*(O) : A \subset O, O \text{ open } \}$
$m_*(A) = \sup\{m_*(K) : K \subset A, K \text{ compact } \}$