

X


<https://swayam.gov.in>

https://swayam.gov.in/nc_details/NPTEL

reviewer4@nptel.iitm.ac.in ▾

[NPTEL \(https://swayam.gov.in/explorer?ncCode=NPTEL\)](https://swayam.gov.in/explorer?ncCode=NPTEL) » [Measure Theory \(course\)](#)
[Announcements \(announcements\)](#)
[About the Course \(https://swayam.gov.in/nd1_noc20_ma02/preview\)](https://swayam.gov.in/nd1_noc20_ma02/preview) [Ask a Question \(forum\)](#)
[Progress \(student/home\)](#) [Mentor \(student/mentor\)](#)

Unit 13 - Riesz representation theorem and Lebesgue differentiation theorem

Course outline

How does an NPTEL online course work?

Sigma algebras, Measures and Integration

Integration and convergence theorems

Outer measure

Lebesgue measure and its properties

Lebesgue measure and positive Borel measures on locally compact spaces

Lebesgue measure and

Week 12 Assessment

The due date for submitting this assignment has passed. **Due on 2020-04-22, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Let $f(x) = x^{\frac{3}{2}} \sin(x^{-1})$ for $x \in (0, 1]$ and $f(0) = 0$. Then, 1 point

f is differentiable at all points in $[0, 1]$

f is absolutely continuous

No, the answer is incorrect.

Score: 0

Accepted Answers:

f is differentiable at all points in $[0, 1]$

f is absolutely continuous

2) Let $f : [0, 1] \rightarrow \mathbb{R}$ be such that $|f(x) - f(y)| \leq |x - y|^2$ for all $x, y \in [0, 1]$. Then, 1 point

f is absolutely continuous

f is not absolutely continuous

No, the answer is incorrect.

Score: 0

Accepted Answers:

f is absolutely continuous

3) Let $f : [0, 1] \rightarrow \mathbb{R}$ be such that $|f(x) - f(y)| \leq |x - y|$ for all $x, y \in [0, 1]$. Then 1 point

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

- Riesz representation theorem I (unit? unit=86&lesson=87)
- Riesz representation theorem II (unit? unit=86&lesson=88)
- Hardy-Littlewood maximal function (unit? unit=86&lesson=89)
- Lebesgue differentiation theorem (unit? unit=86&lesson=90)
- Absolutely continuous functions I (unit? unit=86&lesson=91)
- Absolutely continuous functions II (unit? unit=86&lesson=92)

f maps Cantor set to a set of measure zero

f maps Cantor set to a set of positive measure

No, the answer is incorrect.
Score: 0

Accepted Answers:

f maps Cantor set to a set of measure zero

4) Let $f : \mathbb{R} \rightarrow \mathbb{C}$ be measurable such that for any interval $I \subset \mathbb{R}$, $|\int_I f(x)dx| \geq |I|$ where $|I|$ is the Lebesgue measure of I . Then, **1 point**

$|f| \geq 1$ a.e

$|f| < \frac{1}{2}$ a. e.

No, the answer is incorrect.
Score: 0

Accepted Answers:

$|f| \geq 1$ a.e

5) Let $f \in L^1(\mathbb{R})$ and define $g(x) = \int_{-\infty}^x f(t)dt$. Then, **1 point**

g is uniformly continuous

g is differentiable almost everywhere

No, the answer is incorrect.
Score: 0

Accepted Answers:

g is uniformly continuous

g is differentiable almost everywhere

6) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a continuous function and let $g(x) = \chi_{[0,1]}(x) f(x)$, $x \in \mathbb{R}$ Which of the following are correct? **1 point**

The maximal function Mg of g is in $L^1(\mathbb{R})$

$Mg \in L^2(\mathbb{R})$

$Mg \in L^\infty(\mathbb{R})$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$Mg \in L^2(\mathbb{R})$

$Mg \in L^\infty(\mathbb{R})$

7) Let $f \in L^p(\mathbb{R}^n)$ for some $1 < p < \infty$ and let Q be the unit cube in \mathbb{R}^n . Let $g(x) = \chi_Q(x) f(x)$ $x \in \mathbb{R}^n$. Which of the following are correct? **1 point**

The maximal function Mg of g belongs to $L^q(\mathbb{R}^n)$ for all $1 < q \leq p$

Mg belongs to $L^q(\mathbb{R}^n)$ for all $q > p$

○ Quiz : Week 12
Assessment
(assessment?
name=108)

Weekly Feedback
forms

Video download

No, the answer is incorrect.
Score: 0

Accepted Answers:

The maximal function Mg of g belongs to $L^q(\mathbb{R}^n)$ for all $1 < q \leq p$

8) Let f be a continuous function on \mathbb{R}^n and let Mf be the maximal function of f . If $Mf(0) = 0$ then, **1 point**

f is zero almost everywhere

f is a non-zero constant almost everywhere

No, the answer is incorrect.
Score: 0

Accepted Answers:

f is zero almost everywhere

9) Let $f \in L^1(0, \infty)$ be such that $\int_0^a f(x)dx = 0$ for all $a \in \mathbb{R}$. Then, **1 point**

f is zero almost everywhere

f is an odd function

No, the answer is incorrect.
Score: 0

Accepted Answers:

f is zero almost everywhere

10) Let $f \in L^1(\mathbb{R})$ be such that $\int_{-a}^a f(x)dx = 0$ for all $a \in \mathbb{R}$. Then using the above question, **1 point**

f is zero almost everywhere

f is an odd function almost everywhere

No, the answer is incorrect.
Score: 0

Accepted Answers:

f is an odd function almost everywhere

