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

Announcements (announcements)

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Unit 13 - Riesz representation theorem and Lebesgue differentiation theorem

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

- [ ] 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 $f : \mathbb{R} \to \mathbb{C}$ be measurable such that for any interval $I \subset \mathbb{R}, \left|\int_I f(x)dx\right| \geq |I|$ 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 $f : \mathbb{R} \to \mathbb{R}$ 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