

## Unit 11 - Week 9

## Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

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Week 6

Week 7

Week 8

Week 9

WEEK 8 & 9 - INTRODUCTION

25.1 Axiomatic characterisation of area and the Riemann integral

25.2 Proof of axiomatic characterization

26.1 The definition of the Riemann integral

26.2 Criteria for Riemann integrability

26.3 Linearity of integral

27.1 Sets of measure zero

27.2 The Riemann-Lebesgue theorem

27.3 Consequences of the Riemann-Lebesgue theorem

Quiz : Assignment 9

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lecture notes

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## Assignment 9

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

**Due on 2020-11-18, 23:59 IST.**

1) Which of the following functions defined on  $[0, 1]$  are integrable? 1 point

The function  $x^2$

The Dirichlet function

The function  $\sqrt{x}$

The topologist's sine curve.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

The function  $x^2$

The function  $\sqrt{x}$

2) Let  $f$  be an increasing and bounded function on  $f : [0, 1] \rightarrow \mathbb{R}$ . Then 1 point

$f$  is integrable.

$f$  is integrable iff  $f$  is also continuous.

$f$  is integrable if  $f$  is strictly increasing but need not be integrable if  $f$  is merely increasing.

Irrespective of the partition  $P$  of  $[0, 1]$ , we always have  $U(f, P) > L(f, P)$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:

$f$  is integrable.

3) Let  $f : [0, 1] \rightarrow \mathbb{R}$  be integrable. Then 1 point

If we modify the value of  $f$  at one point then the modified function is also integrable.

If we modify the value of  $f$  at finitely many points then the modified function is also integrable.

If the value of  $f$  is modified on a set of measure zero then the modified function is integrable.

If we modify the value of  $f$  at countably many points then the modified function is also integrable

No, the answer is incorrect.  
Score: 0

Accepted Answers:

If we modify the value of  $f$  at one point then the modified function is also integrable.

If we modify the value of  $f$  at finitely many points then the modified function is also integrable.

4) Which of the following properties about a function  $f : [a, b] \rightarrow \mathbb{R}$ ,  $a < b$  is guaranteed if it is integrable. 1 point

$f$  is differentiable at least at one point in  $[a, b]$

$f$  is continuous at least at one point in  $[a, b]$

$f$  satisfies the intermediate value property

The set of discontinuities of  $f$  cannot be uncountable

No, the answer is incorrect.  
Score: 0

Accepted Answers:

$f$  is continuous at least at one point in  $[a, b]$

5) Let  $f, g : [a, b] \rightarrow \mathbb{R}$  be integrable. Then 1 point

The function  $|f|$  is integrable.

The function  $f^2g$  is integrable.

The function  $\min\{f^2, g\}$  is integrable.

The function  $\max\{f, g^2\}$  is integrable.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

The function  $|f|$  is integrable.

The function  $f^2g$  is integrable.

The function  $\min\{f^2, g\}$  is integrable.

The function  $\max\{f, g^2\}$  is integrable.

6) Which of the following were used in the proof of the Riemann–Lebesgue theorem. 1 point

The fundamental theorem of calculus.

Existence of Lebesgue number for an open cover of a compact set.

The countable union of sets of measure zero is a set of measure zero

The notion of the oscillation of a function at a point.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

Existence of Lebesgue number for an open cover of a compact set.

The countable union of sets of measure zero is a set of measure zero

The notion of the oscillation of a function at a point.

7) Which of the following were used to prove that any continuous function  $f : [a, b] \rightarrow \mathbb{R}$  is integrable. 1 point

Heine–Borel theorem.

Uniform continuity.

The extreme value theorem

Countable union of sets of measure zero is a set of measure zero.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

Uniform continuity.

The extreme value theorem