

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

● 28.1 Levi monotone convergence theorem for step functions

● 28.2 Monotone convergence theorem for upper functions

● 28.3 Monotone convergence theorem for Lebesgue integrable functions

● 29.1 The Lebesgue dominated convergence theorem

● 29.2 Applications of the convergence theorems

● 30.1 The problem of measure

● Week 10 Feedback Form: Real Analysis II

○ Quiz: Week 10 : Assignment 10

Week 11

Week 12

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Week 10 : Assignment 10

The due date for submitting this assignment has passed.

Due on 2021-10-06, 23:59 IST.

As per our records you have not submitted this assignment.

1) Let $f_n \in L(I)$ converge pointwise to $f : I \rightarrow \mathbb{R}$. Under which of the following assumptions can you conclude that $f \in L(I)$? **3 points**

If f_n are continuous

If each f_n is bounded.

If f_n is a monotone sequence

If f_n is a monotone, non-negative and there exists $g \in L(I)$ such that $f_n \leq g \forall n \in \mathbb{N}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

If f_n is a monotone, non-negative and there exists $g \in L(I)$ such that $f_n \leq g \forall n \in \mathbb{N}$

2) In the statement of dominated convergence theorem, suppose we replace the dominating function g by a constant $M > 0$, that is, we assume that $|f(n)| < M$. Then which of the following are true? **3 points**

The conclusion of the theorem is still true.

The conclusion of the theorem is true whenever I is a bounded interval

The conclusion of the theorem never holds *unless* I is a bounded interval.

If I is an unbounded interval then we can always find a sequence $f_n \in L(I)$ that is bounded above by M but yet the limit function f is not Lebesgue integrable.

No, the answer is incorrect.

Score: 0

Accepted Answers:

The conclusion of the theorem is true whenever I is a bounded interval

If I is an unbounded interval then we can always find a sequence $f_n \in L(I)$ that is bounded above by M but yet the limit function f is not Lebesgue integrable.

3) Which of the following can be deduced from the dominated convergence theorem? **2 points**

Any pointwise limit of Lebesgue integrable functions is Lebesgue integrable.

If $f_n : [a, b] \rightarrow \mathbb{R}$ are Riemann integrable, uniformly bounded and f_n converges pointwise to a Riemann integrable function f then

$$\int_b^a f = \lim_{n \rightarrow \infty} \int_b^a f_n.$$

Any pointwise limit of continuous functions is Lebesgue integrable

The uniform limit of continuous functions is Lebesgue integrable.

No, the answer is incorrect.

Score: 0

Accepted Answers:

If $f_n : [a, b] \rightarrow \mathbb{R}$ are Riemann integrable, uniformly bounded and f_n converges pointwise to a Riemann integrable function f then

$$\int_b^a f = \lim_{n \rightarrow \infty} \int_b^a f_n.$$