

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

 16.1 The Banach fixed point theorem

 16.2 Newton's method

 17.1 The inverse function theorem

 18.1 Diffeomorphism and local diffeomorphisms

 18.2 The implicit function theorem

 Quiz: Week 6: Assignment 6

 Week 6 Feedback Form: Real Analysis II

 Lecture materials

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Download Videos

Week 6: Assignment 6

The due date for submitting this assignment has passed.

Due on 2021-09-08, 23:59 IST.

As per our records you have not submitted this assignment.

1) Which of the following statements are true?

2 points

 Any C^1 -smooth map $f : \mathbb{R}^n \rightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is a surjective map.

 Any C^1 -smooth map $f : \mathbb{R}^n \rightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is an injective map.

 If $f : \mathbb{R}^n \rightarrow \mathbb{R}^m$ C^1 -smooth map whose derivative map is invertible everywhere then $n = m$.

 Any C^1 -smooth map $f : \mathbb{R}^n \rightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is a local diffeomorphism.

No, the answer is incorrect.
Score: 0
Accepted Answers:
If $f : \mathbb{R}^n \rightarrow \mathbb{R}^m$ C^1 -smooth map whose derivative map is invertible everywhere then $n = m$.
Any C^1 -smooth map $f : \mathbb{R}^n \rightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is a local diffeomorphism.

 2) Let $f : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be the map $f(x, y, z) = (x + y, xy, z^2)$.

0 points

 The derivative map is **not** invertible at $(1, 1, 1)$ and therefore by the inverse function theorem f is **not** injective in any ball centred at $(1, 1, 1)$.

 The derivative map is invertible at $(1, 1, 1)$ and therefore by the inverse function theorem f is injective in some ball centred at $(1, 1, 1)$.

 f is **not** injective in any ball centred at $(1, 1, 1)$.

 If the derivative map of a map $g : U \rightarrow F$ is not invertible at $a \in U$ then g **cannot** be injective in any ball centred at a .

No, the answer is incorrect.
Score: 0
Accepted Answers:
 *f is **not** injective in any ball centred at $(1, 1, 1)$.*

3) Which of the following sets can be locally expressed as graphs?

2 points

 The unit sphere in \mathbb{R}^n .

 The union of the x and y axes in \mathbb{R}^2 .

 The set of zeroes in \mathbb{R}^2 of a polynomial in the two variables x and y .

 The image of C^1 -smooth curve $\gamma : (a, b) \rightarrow \mathbb{R}^n$.

No, the answer is incorrect.
Score: 0
Accepted Answers:
The unit sphere in \mathbb{R}^n .

4) Which of the following can be used to give a proof of the inverse function theorem?

2 points

The Banach contraction mapping principle.

The implicit function theorem.

Newton's method.

The fundamental theorem of calculus.

No, the answer is incorrect.
Score: 0
Accepted Answers:
The Banach contraction mapping principle.
The implicit function theorem.
Newton's method.