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 $f : \mathbb{R}^n \longrightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is a surjective map.
- [ ] Any C^1 -smooth map $f : \mathbb{R}^n \longrightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is an injective map.
- [ ] If $f : \mathbb{R}^n \longrightarrow \mathbb{R}^m$ C^1 -smooth map whose derivative map is invertible everywhere then $n = m$.
- [ ] Any C^1 -smooth map $f : \mathbb{R}^n \longrightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is a local diffeomorphism.

No, the answer is incorrect.
Score: 0

Accepted Answers:
If $f : \mathbb{R}^n \longrightarrow \mathbb{R}^m$ C^1 -smooth map whose derivative map is invertible everywhere then $n = m$.
Any C^1 -smooth map $f : \mathbb{R}^n \longrightarrow \mathbb{R}^n$ whose derivative map is invertible everywhere is a local diffeomorphism.

2) Let $f : \mathbb{R}^3 \longrightarrow \mathbb{R}^3$ 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 the- orem 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 $g : U \longrightarrow F$ 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 $\gamma : (a, b) \longrightarrow \mathbb{R}^n$.

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.