Info

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Submersions, immersions and embeddings of smooth manifolds

Definition. Submersions, immersions of smooth manifolds

A smooth map $F : M \to N$ is called a

- **submersion** if $F_* : T_pM \to T_{F(p)}N$ is *surjective* at each point $p \in M$
- **immersion** if $F_* : T_pM \to T_{F(p)}N$ is *injective* at each point $p \in M$

Definition. Embeddings of smooth manifolds

A map $F : M \to N$ is called a

- **topological embedding** if $F : M \to F(M)$ is a homeomorphism with the subspace topology of $F(M) \subseteq M$
- **smooth embedding** if
  - $F : M \to F(M)$ is a homeomorphism (that is, is a topological embedding)
  - and F is an **immersion**, that is, $F_* : T_pM \to T_{F(p)}N$ is *injective* at each point $p \in M$

> **Proposition:**
>
> - Injective proper immersion is an **embedding**.
> - If M is compact, then an injective immersion $M \to N$ is an **embedding**.

Current note has 0 direct children and 0 total descendants.

- structures based on sets
  - manifolds
    - smooth $\mathbb{R}$-manifold
      - Functions between smooth manifolds
        - Submersions, immersions and embeddings of smooth manifolds

And it has 5 siblings.

- structures based on sets
  - manifolds
    - smooth $\mathbb{R}$-manifold
      - Functions between smooth manifolds
        - Critical values of smooth maps between manifolds
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