Useful theorems for Manifolds and Topology Preliminary Exams

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1 Manifolds

Unless otherwise stated, the following definitions come from [**?**].

Definition. *A smooth map $F : M \to N$ is called a smooth immersion if its differential is injective at each point (equivalently if* $\operatorname{rank} F = \dim M$*)*

Definition. *Let M, N be smooth manifolds with or without boundary. A* ***smooth embedding of M into*** *N is a smooth immersion $F : M \to N$ which is also a topological embedding, i.e. a homeomorphism onto its image $F(M) \subseteq N$ in the subspace topology.* NOTE: *A smooth embedding is both a topological embedding and a smooth immersion not just a topological embedding which happens to be smooth.*

2 Topology

Unless otherwise stated, the following definitions come from [**?**].

References

[1] Allen Hatcher. *Algebraic Topology* Cambridge University Press, Cambridge, U.K., 2001

[2] John M. Lee. *Introduction to Smooth Manifolds.* Springer, New York, U.S.A., 2013