

MA3402 HOMEWORK

Homeworks are intended as quick exercises to help solidify key ideas from the previous week. If you are spending a long time on them, stop and talk it over with someone.

1. HOMEWORK 8

- (1) Let U be the open set $(0, \infty) \times (0, 2\pi)$ in the (r, θ) -plane \mathbb{R}^2 . Define $F: U \rightarrow \mathbb{R}^2$ by $F(r, \theta) = (r \cos \theta, r \sin \theta)$. Is F orientation preserving or orientation reversing onto its image?
- (2) For a smooth map $f: \mathbb{R}^{n+1} \rightarrow \mathbb{R}$ with regular value 0, show that $f^{-1}(0)$ is an orientable submanifold of \mathbb{R}^{n+1} .
- (3) Find both the topological boundary $\text{bd}(M)$ and manifold boundary ∂M of $M = [0, 1) \cup \{2\}$.
- (4) Choose at least a question from Exercise Sheet 3 to do. I suggest questions 4 or 5.
- (5) Tell at least one other person about non-orientability in the motion of our arm: think about rotating a hand/fingers around the wrist. (seen in Thursday's lecture)