Problem 1 (1)**.** *For the map $\phi(x) = x\sin(x)$ of the real line to itself, what are the regular values?*

Proof. □

Problem 2 (3)**.** *For the map $\phi(x, y) = \sin(x^2 + y^2)$ of the plane to the line, what are the regular values?*

Proof. □

Problem 3 (5)**.** *Let $\gamma : \mathbb{R} \to \mathbb{R}^2$ be a smooth curve in the plane. Let K be the set of all $r \in \mathbb{R}$ such that the circle of radius r about the origin is tangent to the curve γ at some point. Show that K has empty interior in $\mathbb{R}$.*

Proof. □

Problem 4 (6)**.** *If C is a circle embedded smoothly in $\mathbb{R}^4$, show that there exists a three-dimensional hyperplane H such that the orthogonal projection of C to H is an embedding.*

Proof. □