Exercises

E22.2 [1QO]Prerequisites:[1GD].Let $A \subset \mathbb{R}^n$ be open and $f : A \to \mathbb{R}$ in C^1. Fix $\overline{x} \in A$ such that $f(\overline{x}) = 0$, and $\nabla f(\overline{x}) \neq 0$: by the implicit function theorem [1GD] the set $E = \{f = 0\}$ is a graph in a neighborhood of $\overline{x}$, and the plane tangent to this graph is the set of x for which

$$\langle x - \overline{x}, \nabla f(\overline{x}) \rangle = 0 \ .$$

*Compare this result to Lemma 7.7.1 in the notes [**?**]: "the gradient is orthogonal to the level sets" .*

Solution 1. *[1Q1]*