Homework #6

Raymond Deneckere

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1. Let $f : \mathbb{R}^n \to \mathbb{R}$ be a C^2-function. Define $S = \{u \in \mathbb{R}^n : \| u \| = 1\}$, and let $x^* \in \mathbb{R}^n$. Suppose that for every $u \in S$, the function $g(\lambda) = f(x^* + \lambda u)$ satisfies $g'(0) = 0$ and $g''(0) < 0$, so that $g(\cdot)$ has a strict local maximum at $\lambda = 0$.

   (a) Interpret $g'(0)$.

   (b) Prove that x^* is a strict local maximum of f.

2. Sundaram, #4, parts (a), (b) and (c), p. 110.

3. Sundaram, #1, p.142

4. Sundaram, #2, p.142

5. Sundaram, #3 part (a), p. 142.