MAT 215: PROBLEM SET 7

DUE THURSDAY MARCH 31

Reading: Abbot, Sections 7.2-7.5

Problem 1: A function is convex if for every $x, y \in (a, b)$ and $0 < \lambda < 1$,

$$f(\lambda x + (1-\lambda)y) \leq \lambda f(x) + (1-\lambda)f(y).$$

Suppose that $f\colon (a,b) \to \mathbb{R}$ is differentiable and that $f'\colon (a,b) \to \mathbb{R}$ is differentiable. Prove that if $f''(x) \geq 0$ for every $x \in (a,b)$, then f is convex. (**Hint:** Consider a linear function, g such that $g(x) = f(x)$ and $g(y) = f(y)$.)

Abbot exercises: 4.5.4, 4.5.6, 5.2.5, 5.3.2, 5.3.7, 5.3.12.