Math 325-001 - Fall 2016. Homework 7

Due: Wednesday, Nov 30, in class.

- *STAPLE!*
- *NO fuzzy edges on pages improperly torn from spiral binder notebooks!*
- *Typing is not mandatory, but highly encouraged if you have a suitable typesetting system at your disposal.*
- *If it's not legible, it's not there.*

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1. Prove that for any $m, b \in \mathbb{R}$ the function given by $f(x) = mx + b$ is differentiable on $\mathbb{R}$ and that $f'(p) = m$.
   When writing up the proof, define $D_p(h)$, as we did in class.
2. Page 113. #5
   (You may use what you already know about derivatives from Calculus 1, when differentiating)
3. Suppose that function f is continuous on $[a, b]$ and differentiable on (a, b). Assume also there exists $M \geq 0$ such that $|f'(x)| \leq M$. Prove that for any $x, y \in [a, b]$ we have
   $$|f(x) - f(y)| \leq M|x - y|$$
4. Page 113. Problems #7 and #8 (they are related)