MATH 104
Homework 5 – Due March 7, 2017
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A select number of these questions will be graded (although the *starred* questions are optional, and will not be graded). Feel free (and encouraged!) to work with your classmates on this homework and come and talk about them in office hours, but you **must** write up your own solutions. Indicate on your homework the set of people with whom you worked, if that set is non-empty.

1. Ross §18, pages 138-139: Exercises 2, 4 ("on S" means that the domain of the function is S), 6, 9
2. Ross §19, pages 151-152: Exercises 1(abcd), 2(b), 7a (you'll need to find an explicit δ that works)
3. We proved in class that a continuous function $f : [0, 1] \to [0, 1]$ has a fixed point. Give an example of a (necessarily not continuous) function $g : [0, 1] \to [0, 1]$ that is a bijection with no fixed point. Give an example of a continuous function $h : (0, 1) \to (0, 1)$ that is a bijection with no fixed point.
4. (*optional*) Suppose that $f : [0, \infty) \to \mathbb{R}$ is continuous, and for every sequence (x_n) of non-negative numbers such that $x_n \to \infty$, the limit $\lim f(x_n) = L$, for some finite number L (the same L for every sequence). Must f be uniformly continuous on $[0, \infty)$? Give a proof or a counterexample.