

MATH 104  
Homework 6 – Due March 14, 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 §24, pages 199-200: Exercises 1, 2, 6, 11, \*13
2. For each of the following statements, find examples of sequences  $(f_n)$  on  $S$  that converge pointwise to  $f$  such that the statement is false.
  - (a)  $\lim_{n \rightarrow \infty} (\sup \{|f_n(x)| \mid x \in S\}) = \sup \{|f(x)| \mid x \in S\}$ .
  - (b) If  $(x_k)$  is a sequence in  $S$  converging to  $x_0$ , then  $\lim_{k \rightarrow \infty} f(x_k) = \lim_{n \rightarrow \infty} f_n(x_0)$ .
  - (c) If  $f$  is differentiable, and  $f_n$  is differentiable for each  $n$ , then  $\lim_{n \rightarrow \infty} \left( \frac{df_n}{dx} \right) = \frac{df}{dx}$ .
  - (d) If  $f$  is integrable on  $[a, b] \subset S$ , and  $f_n$  is integrable  $[a, b] \subset S$  for each  $n$ , then  $\lim_{n \rightarrow \infty} \left( \int_a^b f_n(x) dx \right) = \int_a^b f(x) dx$ .