Mathematics UN1102 Section 3, Fall 2017 — Homework 5

Due date: 4:10pm on Wednesday, October 18, 2017 on Gradescope.

Instructions: Please present your solutions in a legible, coherent manner. Unless otherwise specified, you should show your work; you will be evaluated on both your reasoning and your answer. Points may be deducted for unclear or messy solutions.

Collaboration and Academic Integrity: You are encouraged to collaborate on homework. However, you must write your solutions alone and **understand what you write**. When submitting your homework, list in the space below any sources you used (in print, online, or human) other than the textbook or the teaching staff.

Problems: All problems are from the course textbook *Calculus: Early Transcendentals* (8th edition).

- Section 11.1: 30, 31, 38, 49, 51
- Use the squeeze theorem to show that the limit of the sequence $\{a_n\}$ is 0 in each of the following problems: Section 11.1: 35, 46, 56.[1]
- Suppose $\{a_n\}$ is a sequence. We can form a new sequence $\{a_{2n}\} = a_2, a_4, a_6, \ldots$ by taking every other term of $\{a_n\}$. If the new sequence $\{a_{2n}\}$ converges, is it necessarily true that $\{a_n\}$ is convergent? If true, explain why. If false, give an example of a sequence $\{a_n\}$ where $\{a_{2n}\}$ converges but $\{a_n\}$ does not.

[1] That is, find sequences $\{b_n\}$ and $\{c_n\}$ such that $b_n \leq a_n \leq c_n$ for all n and

$$\lim_{n\to\infty} b_n = \lim_{n\to\infty} c_n = 0.$$

Be sure to justify why each of these claims holds.