# MATH 413 – QUIZ 2 – Fall 2020 ‖ 50 POINTS

**Instructions:**

- Due Wednesday 10/28/2020 by 5pm.
- Either turn in your quiz as a digital pdf file on Blackboard. Name the digital file precisely as follows: "`quiz02_math413_lastname.pdf`" with "`lastname`" replaced by your surname (i.e. family name, last name).
- You may use your course notes, my notes, and our course textbook as references.
- No collaboration allowed.
- No computational devices allowed.
- You must clearly justify all steps in your work. If you state an inequality or bound, be sure to justify it.

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1. (10 pts) Let $a_n = (-1)^n + \frac{1}{n}$. Find $\limsup_{n\to\infty} a_n$ and $\liminf_{n\to\infty} a_n$. You do not need to write a proof, but you should show clear work and reasoning to justify your answer. Find a convergent subsequence.

2. (20 pts) Let $f(x) = \frac{x^2+x-6}{5x+10}$. Evaluate $\lim_{x\to\infty} f(x)$. Prove your result directly using only Section 3.1 definitions.

3. (20 pts) Let $f(x) = \frac{x^2-4}{x-2}$. Evaluate $\lim_{x\to 2} f(x)$. Prove your result directly using only Section 3.2 definitions.