Instructions for the exam:

- You have 1 hour to write solutions to the four problems below. Each problem is worth 8 points.
- You must write in complete sentences and justify all of your work.
- You are NOT allowed to use outside resources, such as notes, the textbook, the internet, or people.
- Before you begin, copy the following statement and sign your name:

  "All solutions will be my own and I will not consult outside resources. I understand that doing otherwise would be unfair to my classmates and a violation of the U's honor code."
  -Your Signature

- At the end of 1 hour, stop writing and begin scanning your solutions and uploading them to Gradescope, as you would do with a homework assignment.
  - Create a PDF scan of your work and save it to your computer.
  - Go to `https://www.gradescope.com/courses/79451`, click "Exam 2" to upload your PDF.
- If technical difficulties arise, private-message me in the chat, or send an email to moss@math.utah.edu.

Exam 2, Math 3210
October 16, 2020

1. (8 pts) Show, directly from the definition of convergence, that $\lim_{n\longrightarrow\infty} \frac{3n+1}{n-2} = 0$.
2. (8 pts) Suppose $\{a_n\}$ is a sequence converging to a and $\{b_n\}$ is a sequence converging to b. Prove that the sequence $\{a_n + b_n\}$ converges to $a + b$. (You may not cite the Main Limit Theorem in your proof.)
3. (8 pts) Show that if a_n is a Cauchy sequence, then a_n^2 is also a Cauchy sequence.
4. (8 pts) Say whether the following statement is true or false, and prove your answer.

   There exists a sequence $\{a_n\}$ such that:

   (i) $\{a_n\}$ has a subsequence that converges to 0, and

   (ii) $\lim a_n = 1$.