MATH 265 Homework 6

Due Oct 17

Instructions:

- Please scan your work and upload it to Gradescope by **the end of Oct 17**.

1 Non-Graded Questions

Textbook Section 3.1: Questions 4, 5, 8, 9, 18
Textbook Section 3.2: Questions 1, 2, 3, 15, 18, 22, 23

2 Graded Questions

1. (2 points) Use the definition of a limit to show that

$$\lim_{n \to \infty} \frac{\sqrt{2n}}{\sqrt{n+1}} = \sqrt{2}.$$

2. (2 points) Use the definition of a limit to show that

$$\lim_{n \to \infty} \frac{\cos n}{n^2} = 0.$$

3. (2 points) Show that

$$\lim_{n \to \infty} \frac{2^n}{n!} = 0.$$

   You can use limit theorems covered in the class.

4. (a) (2 points) Give an example of a convergent sequence (x_n) of positive numbers with $\lim \left(\frac{x_{n+1}}{x_n} \right) = 1$.

   (b) (2 points) Give an example of a divergent sequence with this property. (Thus, this property cannot be used as a test for convergence.)