

**Homework**

Thursday, October 10

Follow the separate general guidelines for Parts A,B,C. Be sure to include and label *all four* standard parts (a), (b), (c), (d) of Part A in what you hand in.

**Monotone real functions**

Section 3.2.3

**A: Reading questions.** Due by 3pm, Mon., 21 Oct.

1. Give your own examples of a function that is strictly increasing on the interval  $(0, 1)$ , and of a function that is strictly decreasing on the interval  $(0, 1)$ .
2. Give an example of a function that is **neither** strictly increasing **nor** strictly decreasing on the interval  $(0, 1)$ .
3. What is the significance of a function being strictly monotone on a subset  $S$  of its domain?
4. How can you use calculus to show a function is strictly increasing, or to show it is strictly decreasing?
5. On p. 103, the text claims "...although we know that the factorial sequence  $s$  with  $s(n) = n!$  is monotone, we could not use Theorem 3.7 to prove that." Why can we not use Theorem 3.7 to prove that?
6. Near the end of Example 1, there is the string of relations (equalities and inequalities):

$$s_{k+1} = \frac{1}{8}(3s_k + 4) > \frac{1}{8}\left(3 \cdot \frac{4}{5} + 4\right) = \frac{4}{5}.$$

The following sentence claims that something is true by mathematical induction, using this string of relations. Exactly which equality or inequality follows from mathematical induction? What is the justification for each of the other relations (equalities and inequalities)?

**B: Warmup exercises.** For you to present in class. Due by end of class Tue., 22 Oct.

**3.2.3 Problems:** 1, 2, 3, 4, 11