

**Math131A Set 3**

Due on Monday, **July 15, 2013**, before the Midterm Exam.

Collaboration is encouraged, as long as you **write your own solutions** and **write down the name of your collaborators**.

## 11. SUBSEQUENCES

11.1. Consider the sequences defined as follows:  $a_n = 1/n^2$ ,  $b_n = (-1)n^3$ ,  $c_n = \frac{3n+2}{4n-7}$ ,  $d_n = 23^{(-1)^n}$ .

- (a) For each sequence, give an example of a monotone subsequence.
- (b) For each sequence, give its set of subsequential limits.
- (c) For each sequence, give its lim sup and lim inf.
- (d) Which of the sequences converges? diverges to  $+\infty$ ? diverges to  $-\infty$ ?
- (e) Which of the sequences is bounded?

11.2. Suppose  $(a_n)$  is a subsequence of  $(b_n)$ , and  $(b_n)$  is a subsequence of  $(c_n)$ . Prove that  $(a_n)$  is a subsequence of  $(c_n)$ .

11.3. Prove that  $\liminf s_n = -\limsup(-s_n)$ .

## 12. MORE SUBSEQUENCES

Do exercises 12.1, 12.4, 12.8, 12.10 in Ross.

## 14. SERIES

Do exercises 14.6, 14.8, 14.9 in Ross.

14.1. Determine which of the following series converge. Justify your answers.

- (a)  $\sum \cos n$
- (b)  $\sum_{n=10}^{\infty} (\log n)^{-2}$
- (c)  $\sum (\sqrt{n+1} - \sqrt{n})$
- (d)  $\sum \frac{n^3}{1.7^n}$

## 15. MORE SERIES

Do exercises 15.6, 15.7 and 15.8 in Ross.