HW3

- Reading: pp. 47–58.
- pp. 78–82: 1,2,5,20.
- Suppose $\{x_n\}$ is a bounded numerical sequence of real numbers. Let $\widetilde{X}$ denote the set of its subsequential limits. Is it true that $\widetilde{X}$ is a closed set?
- Does the following limit exist? If yes, find it.

$$\lim_{n\to\infty} \frac{n + (-1)^n}{n - (-1)^n}.$$

- Does the following limit exist? If yes, find it.

$$\lim_{n\to\infty} \left(\frac{1}{2} + \ldots + \frac{1}{2^n} \right).$$

- Does the following limit exist? If yes, find it.
    - (a) If you are not in honors program, do this problem:

$$\lim_{n\to\infty} \frac{n \sin(n!)}{n^2 + 1},$$

(as usual, $n!$ denotes n factorial.)
    - (b) If you are in honors program, do this problem:

$$\lim_{n\to\infty} x_n,$$

where

$$x_n = \sqrt{7 + \sqrt{7 + \ldots + \sqrt{7}}}$$

and in that expression n roots are taken.