

When you hand in this problem set, please indicate on the top of the front page how much time it took you to complete.

Reading. §§1.6–1.8.

Problems from the book: the starred problems will be graded.

- 1.6.2, 1.6.3, 1.6.6*, 1.6.8.
- 1.7.1, 1.7.2, 1.7.4, 1.7.6, 1.7.10*, 1.7.11, 1.7.17, 1.7.18

Additional problems:

1. Give an example of a sequence in \mathbb{R} that has the properties that, first, for every natural number $k \in \mathbb{N}$, there is a subsequence converging to k ; and second, for any convergent subsequence, the limit is a natural number.
2. Find all solutions to $z^2 + (3 + 3i)z - (2 + 6i)$.
3. Let $f : \mathcal{M}_{2 \times 2}(\mathbb{R}) \rightarrow \mathcal{M}_{2 \times 2}(\mathbb{R})$ be the function defined by $f(A) = A \cdot A^T$, the product of the matrix with its transpose. What is the directional derivative of f at the point $B = \begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix}$ in the direction of $\vec{v} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$? Is the directional derivative at B linear as a function of \vec{v} ?