

Scientific Writing: Problem Set 1

October 6, 2026

Task 1. Choose a small and not too difficult subfield that you know well (for example, algorithms for constructing balanced trees, sorting algorithms, linear error-correcting codes, NP-hardness, or classification algorithms).

State its fundamental definitions and theorems. Write an intuitive introduction to them. Aim for approximately three quarters of a page.

Task 2. Choose a problem for which several alternative solutions exist (for example, constructing a minimum spanning tree, sorting, or binary classification).

Write an outline of a paper that compares these solutions from both theoretical and practical perspectives.

The outline should specify the most important points and their order, rather than provide the actual content or definitions.

Task 3. Find two nontrivial problems, for example from an exam, a problem set, or a textbook. Write a detailed solution to them.

Task 4. Recall a difficult proof that you encountered during your studies (for example, the time-complexity analysis of Union-Find, a rigorous proof of the correctness of boosting, or Savitch's theorem).

Find the proof in a textbook, lecture notes, your notes. Write down its structure, including the lemmas and other intermediate steps.

Has the “difficulty” of the proof been successfully encapsulated in the lemmas?

Task 5 (This task is more difficult and is not intended for pair discussion). Choose a paper in an area that you know well, for example because you have completed an advanced course on the subject.

Read its introduction. Examine its bibliography and read the introductions of the papers that seem important. Determine which subsequent papers cite them, for example by using a citation index (citeseer or other).

Write an outline of a survey summarising your research.