# **Homework Three**, for Fri 10/16

CSE 101

Prepare a PDF file in which your solution to each of the following problems (1–7) begins on a fresh page. Upload the file to Gradescope, using your campus email address as login. The deadline is noon on Friday.

These problems cover the following skills and concepts:

- Familiarity with the mechanics of depth-first search and its use in uncovering connectivity structure and discovering the existence of cycles
- Directed acyclic graphs and topological orderings
- Strongly connected components and the two-tiered decomposition of directed graphs
- The ability to relate real-world questions to familiar graph-theoretic concepts
- The ability to write crisp and unambiguous pseudocode that works with the adjacency list data structure and invokes algorithms from class like `explore` and `scc`

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1. *DFS example.* Solve textbook problem 3.2(a). You need only show tree edges and back edges (ignore the bit about forward and cross edges).
2. *Topological orderings.* Textbook problem 3.3.
3. *Strongly connected components.* Textbook problem 3.4(ii).
4. *An alternative algorithm for topological sorting.* Textbook problem 3.14.
5. *Relating real-world problems to familiar graph-theoretic concepts.* Textbook problem 3.15.
6. *Understanding SCCs and using them in an algorithm.* Textbook problem 3.22.
7. *Understanding DAGs and the two-tiered decomposition of directed graphs.* Textbook problem 3.25.