Here are four problems to help you practice with space complexity. You are not supposed to hand in your solutions.

A.A. Do Exercise 8.4 (about closure properties of $PSPACE$).

A.B. Is $PSPACE$ closed under concatenation? (Exercise 8.4 asks about other closure properties, but not this one.)

The space complexity class L consists of all problems that can be solved in logarithmic space. To make such a concept meaningful, we have to ignore the space used to store the input. For a precise definition of L, see Section 8.4 of our textbook. We will now do an enhanced version of Problem 8.17.

B.A. Deciding whether a string of parentheses is a valid nest is one of our classic PDA problems. How much stack space did our PDA solution use?

B.B. Solve Problem 8.17 (about valid parenthesis nests).

C. Do Problem 8.8 (about EQ_{REX}).

This last problem might not be doable until Day 28.

D. Suppose that a language A is decidable in space $s(n)$ on a non-deterministic Turing machine. Using $\mathcal{O}$ notation, find an upper bound (not a lower bound) on the time required to decide A on a deterministic Turing machine.