

Name: _____

1. (1 pt.)

- **Read all material carefully.**
- *If in doubt whether something is allowed, ask, don't assume.*
- You may refer to your books, papers, and notes during this test.
- No computer or network access of any kind is allowed (or needed).
- Write, and draw, carefully. Ambiguous or cryptic answers receive zero credit.
- Use class and textbook conventions for notation, algorithmic options, etc.

Write your name in the space provided above.

2. (7 pts.) In the following Java fragment, assume values are small enough to avoid overflows.

- What is the value of `s` after the outer for loop ends in the following Java fragment, as a function of `n`? Provide as compact an answer as you can.
- Provide an exact numerical answer for `n = 10`.
- Briefly explain why both answers are correct.

```
1      int s = 0;
2      for(int i = 0; i < n; i++) {
3          for(int j = i; j < i*i*i; j++) {
4              s += 1;
5          }
6      }
```

3. (8 pts.) Trace the operation of the LCS-LENGTH algorithm (p. 394) on the sequences below. **Depict** the state of the b and c arrays (1) **after four iterations** of the outer nested loop and (2) **at the end** of the algorithm.

```
A B A D A Y A A Y
B Y A D D B A Y
```

4. (14 pts.)

- (a) Provide pseudocode for *linear search*. The input is an array $A[1, 2, \dots, n]$ of integers and another integer, v , which is the searched value. The output is *nil* if there is no array element equal to v ; otherwise, it is the smallest index i such that $A[i] = v$.
- (b) Sketch the proof of correctness of your pseudocode using appropriate loop invariants.

[additional space for answering the earlier question]