This test will be most effective if you try to complete it without outside help.

**Prior Experience**

*A couple sentences for each question here is all that’s needed.*

1. Briefly describe your previous programming experience.
   a) What courses have you taken?
   b) What languages are you familiar with?
2. Describe a programming project you’ve worked on, either for or outside of a course.
3. What do you hope to get out of this class?

**Short-Answer Knowledge**

*If you don’t know the answer to a question, just write “I don’t know” as your answer.*

4. What is the difference between a stack and queue? Briefly describe both.
5. Describe a heap data structure.
6. Describe a hash table/dictionary and what it’s useful for.
7. What is the point of *encapsulation* as it relates to object-oriented programming?

**Programming**

*Feel free to use pseudocode or any language you know well.*

8. Write a function `is_prime(n)` to determine if a positive integer `n` is prime.

9. Write a function `print_permutations(n)` that prints all permutations of the positive integers from 1 to `n` in the standard (increasing) order. For example, `print_permutations(3)` should output the following:

   123, 132, 213, 231, 312, 321.

10. Given an array `data[]` of length `N`:
   a) Write a function `search(value)` which returns the location (index) of value `value` in the array, if it exists, in $O(N)$ time.
   b) Assume the elements of your array are comparable and that you are provided a sort function. Write a function `binary_search(value)` that takes $O(\log N)$ time.