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.
   - E-books may be used *subject to the restrictions* noted in class.
   - Computers are not permitted, except when used strictly as e-books.
   - Network access of any kind (cell, voice, text, data, ...) is not permitted.
   - 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.

WAIT UNTIL INSTRUCTED TO CONTINUE TO REMAINING QUESTIONS.

Do not write on this page below this point.

Q	Full	Score
1	1	
2	9	
3	10	
4	10	
total	30	

2. (9 pts.) Provide pseudocode (using the textbook's conventions) for *linear search*. The input is an array $A[1, 2, \ldots, n]$ 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 $A[i] = v$.

3. (10 pts.) As precisely as you can, prove the correctness of the pseudocode in Question 2 using appropriate loop invariants.

4. (10 pts.) Using the textbook's tabular method, derive an expression for the running time $T(n)$ of the pseudocode of Question 2 where n is the number of items in the input array. Derive as accurate an expression as you can (not merely an asymptotic bound). Then provide as tight an asymptotic bound as you can and explain your answer.