Assignment 7

The due date for submitting this assignment is 23:59 on Wed, 25th April 2023. Please submit your answers via the online submission platform.

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1. Given a function f(x) = 2x + 3, find the value of f(5).

2. A binary tree is a data structure where each node has at most two children. Draw a binary tree with at least 5 nodes.

3. Calculate the sum of the first 1000 positive integers.

4. Write a program to check if a number is prime.

5. Design a circuit using logic gates to perform a full adder operation.

6. Explain the difference between a pushdown automaton and a Turing machine.

7. Implement a function that reverses a given string.

8. A hash table is a data structure that allows for fast retrieval of data. Explain how a hash table works.

9. Design a simple state machine for a vending machine.

10. Write a program to sort an array of integers using the quicksort algorithm.

11. Explain the concept of memory hierarchy in computer systems.

12. Implement a simple calculator that can perform basic arithmetic operations.

13. Discuss the importance of algorithm analysis in computer science.

14. Design a finite state automaton that recognizes a regular expression.

15. Write a program to simulate a simple vending machine.

16. Explain the role of compilers in transforming high-level code into machine code.

17. Implement a program to check if a given string is a palindrome.

18. Design a circuit using logic gates to perform a half subtractor operation.

19. Discuss the importance of error detection and correction in computer systems.

20. Write a program to calculate the factorial of a given number.