# 13 Lecture - CS101

# **Important Subjective**

#### 1. What is an algorithm?

**Answer:** An algorithm is a set of well-defined instructions or rules to solve a problem or accomplish a specific task.

# 2. What is the difference between a linear search and a binary search algorithm?

**Answer:** A linear search algorithm checks each element in a list sequentially until the desired element is found or the end of the list is reached. A binary search algorithm, on the other hand, starts at the middle of a sorted list and divides the list in half repeatedly until the desired element is found or determined to not exist.

#### 3. What is the time complexity of an algorithm, and why is it important?

**Answer:** The time complexity of an algorithm is the amount of time it takes to run as a function of the input size. It is important because it helps to determine the efficiency and scalability of the algorithm.

# 4. What is a sorting algorithm, and give an example?

**Answer:** A sorting algorithm is an algorithm that arranges elements in a list or array in a specific order. An example of a sorting algorithm is the quicksort algorithm.

#### 5. What is a greedy algorithm, and when is it used?

**Answer:** A greedy algorithm is an algorithm that makes the locally optimal choice at each step with the hope of finding a global optimum. It is used when a problem can be divided into subproblems and the solution to each subproblem does not affect the solution to other subproblems.

#### 6. What is a recursive algorithm, and give an example?

**Answer:** A recursive algorithm is an algorithm that calls itself to solve subproblems. An example of a recursive algorithm is the factorial function.

#### 7. What is a divide and conquer algorithm, and give an example?

**Answer:** A divide and conquer algorithm is an algorithm that breaks a problem down into smaller subproblems, solves each subproblem separately, and then combines the solutions to

the subproblems to solve the original problem. An example of a divide and conquer algorithm is the merge sort algorithm.

# 8. What is a dynamic programming algorithm, and give an example?

**Answer:** A dynamic programming algorithm is an algorithm that solves a problem by breaking it down into smaller subproblems, solving each subproblem only once, and storing the solutions to subproblems to avoid redundant computations. An example of a dynamic programming algorithm is the Fibonacci sequence.

### 9. What is a heuristic algorithm, and give an example?

**Answer:** A heuristic algorithm is an algorithm that uses a rule of thumb or an approximation to find a solution quickly, without guaranteeing the optimal solution. An example of a heuristic algorithm is the nearest neighbor algorithm.

# 10. What is an optimization algorithm, and give an example?

**Answer:** An optimization algorithm is an algorithm that finds the best solution to a problem with given constraints. An example of an optimization algorithm is the gradient descent algorithm used in machine learning.