CS113/DISCRETE MATHEMATICS-SPRING 2024

Worksheet 17

Topic: Structural Induction

Today, we will learn another form of induction known as Structural Induction. It is used in mathematical proofs to establish the validity of statements about recursively defined objects or structures. It is particularly useful when dealing with data structures such as lists, trees, graphs, or any other recursively defined entity. Happy Learning!

Student's Name and ID: _____

Instructor's name: _____

1 Structural Induction

To prove using Structural Induction do follwoing steps:

1.1 Basis Step:

Show that the result holds for all the elements specified in the basis step of recursive definition.

1.2 Recursive Step:

Show that if the statement holds for all the elements used to construct new elements in the recursive step of definition, then the statement holds for the new elemenets as well.

1. Which amounts of money can be formed using just twodollar bills and five-dollar bills? Prove your answer using strong induction

2. Prove that every positive integer greater than 1 can be expressed as a product of prime numbers by using strong induction.

3. Prove using structural induction that every positive integer greater than 1 is either a prime number or can be expressed as a product of prime numbers.