COMPUTER SCIENCE 20, SPRING 2014
Module #15 (Recursive Data Types and Structural Induction) - in class
Author: Tawheed Abdul-Raheem

Small group problems

1. Recursive definitions. Recursively define the sets of natural numbers $\mathbb{N}$, Fibonnaci numbers, and integers $\mathbb{Z}$.

   (a) • Base case: Let $0 \in \mathbb{N}$.

   • Constructor case: Given $x \in \mathbb{N}$, $x + 1 \in \mathbb{N}$.

   (b) • Base case: Let $0 \in F(0) = 0$.

   • Base case: Let $1 \in F(1) = 1$.

   • Constructor case: $if\, x \in F$ and $x > 1$ then $F(x) = F_{x-1} + F_{x-2}$.

   (c) • Base case: Let $0 \in \mathbb{Z}$.

   • Constructor case: Given $x \in \mathbb{Z}$, $x + 1 \in \mathbb{Z}$, $x - 1 \in \mathbb{Z}$.