CSC281: Discrete Math for Computer Science

Computer Science Department — First Semester 1442

King Saud University — Tutorial 10: Strong Induction + Recursive Definitions

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Question 1. Find the recursive definition for each of the following sequences $a_n,\ n = 1, 2...$ if:

a) $a_n = 8n$

b) $a_n = 3n + 2$

c) $a_n = 7^n$

d) $a_n = 30$

Question 2. Fine the recursive definition for each of the following

a) the set of all positive integers power of 5.

b) the set of positive integers congruent to 2 modulo 3.

Question 3. Let S be the subset of the set of ordered pairs of integers defined recursively by:
Basis step: $(0, 0) \in S$.
Recursive step: If $(a, b) \in S$, then $(a + 2, b + 3) \in S$ and $(a + 3, b + 2) \in S$.

a) List the elements of S produced by the first five applications of the recursive definition.

b) Use structural induction to show that $5|a + b$ when $(a, b) \in S$.