Assignment # 2

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SUBJECT: THEORY OF AUTOMATA

PROGRAM: BS(cs).

ASSIGNMENT: #2.

Q1. Using RD for Even Numbers prove that 11 is not in Even.

ANS:

By Rule-1: 2 is in Even
By Rule-2: 2+2 = 4 ◊ 4 is in Even
By Rule-2: 4+2 = 5 ◊ 6 is in Even
By Rule-2: 6+2 = 8 ◊ 8 is in Even
By Rule-2: 8+2 = 10 ◊ 10 is in Even
By Rule-2: 10+2 = 12 ◊ 12 is in even
Hence Proved

Q2. Design an RD for Palindrome and prove that the word "aba" is in Palindrome.

ANS:

Step1:

"aba" is in palindrome.

Step2:

if x is palindrome, then s(x)Rev(s) and xx will also be palindrome, where s belongs to Σ^*

Step3:

No strings except those constructed in above, are allowed to be in palindrome.

Q3: Using RD for Polynomials prove that $5x^3 + 4y^2 - 5z + 12$ is in Polynomial.

ANS:

By Rule-1: 5 is in Polynomial
By Rule-2: x is in Polynomial
By Rule-3: 5*x is in Polynomial
By Rule-3: $5x^3$ is in Polynomial $5x^3$ is in Polynomial
By Rule-1: 4 is in Polynomial
By Rule-3: y is in Polynomial
By Rule-1: 4*y is in Polynomial
By Rule-3: $4y^2$ is in Polynomial $5x^3 + 4y^2$ is in Polynomial
By Rule-1: 5 is in Polynomial
By Rule-2: z is in Polynomial $5x^3 + 4y^2 - 5z$ is in Polynomial
By Rule-1: 12 is in Polynomial
By Rule-3: $5x^3 + 4y^2 - 5z + 12$ is in Polynomial $5x^3 + 4y^2 - 5z + 12$ is in Polynomial

Q4: Design an RD for Integers and prove that -4 is in Integers.

Step1:

-4 is in integer.

Step2:

If x is in INTEGER then x-4 are also in INTEGER.

Step3:

No strings except those constructed in above, are allowed to be in INTEGER.

Q5. Theorem: (Hint: Use RD for AE)

No AE can begin or end with the symbol /.

ANS:

By Rule-1: / is not part of any number, so it cannot be included in an AE.

By Rule-2: As x does not contain /, so as (x) or (-x) cannot contain /.

By Rule-3: As neither x nor y can contain /, so any of the expressions defined by Rule-3 can also not contain /.

Therefore: the character / can never get into an AE.