CSE 331 ASSIGNMENT 2

NAME: ANIKA ISLAM

ID: 21101298

SECTION: 07

CSE331 ASSIGNMENT 2

(1) $L1 = \{0^n 1^n 2^n, n \geq 0\}$

Assume L1 to be regular language.

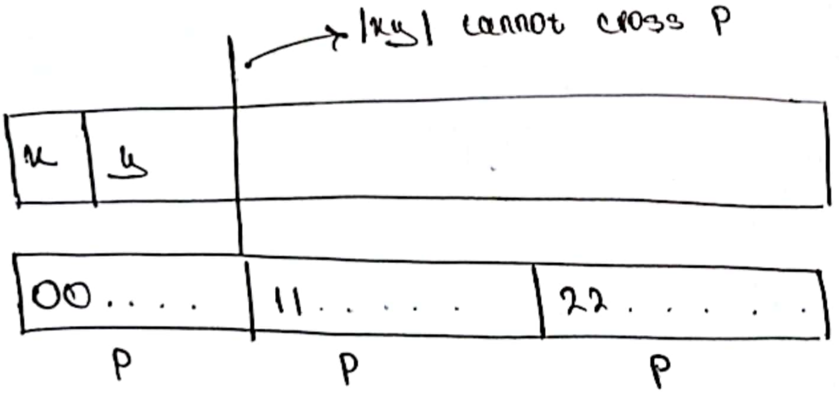
Let the pumping length be p.

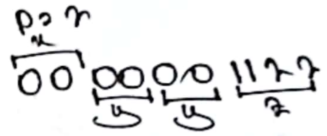
Now, take a long string, w.

$w = 0^p 1^p 2^p$

$|w| = p+p+p$

$|w| = 3p$ (length of w) $[3p \geq p]$





i	p
0	6
1	2
2	2

$|xy| \leq p$

· y contains only 0s. If we pump one more y, then $(xyyz)$ number of 0s increases, number of 1s and 2s remains unchanged.

[n of 0s $\neq$ n of 1s = n of 2s].

$0^p 1^p 2^p$ violates the pumping lemma rule. $[xy^i z \notin A]$

$0^p 1^p 2^p$ ~~does not~~ is not a regular language. $[w \notin L1]$

L1 is not a regular language. (Shown)

(2) $L2 = \{1^n \mid n \text{ is a power of } 2\}$

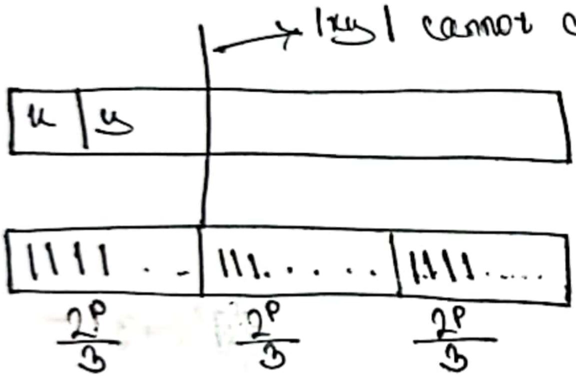
Assume L2 to be regular language.

Let the pumping length be p.

Now, take a long string, w.

$w = 1^{2^p}$

$|w| = 2^p$ (length of w) $[2^p \geq p]$



$|xy| \leq p$

$p = 2$

For xyz, $1^{\frac{2^2}{3}} = 1^{\frac{4}{3}} = 1^{1.33} \approx 1$

For xyz, $\underbrace{1}_{x}\underbrace{111}_{y}\underbrace{1}_{z}$

∴ y contains 1s.

$|xy| \leq p \Rightarrow \frac{2^p}{3} \leq p \Rightarrow p\ln 2 \leq \ln 3p$ [if $p = 2$, $2\ln 2 \nleq 3\ln(3*2)$]

∴ length of xy is not equal to the pumping length.

So, $|xy| \leq p$ is violated.

If we pump one more y (xyyz), then $1^{\frac{2^p}{3}}1^{\frac{2^p}{3}}1^{\frac{2^p}{3}}1^{\frac{2^p}{3}} = 1^{\frac{4 \cdot 2^p}{3}}$ is not the same as 1^{2^p}.

∴ 1^{2^p} violates the pumping lemma rule. $[xy^iz \notin A]$

1^{2^p} is not a regular language. $[w \notin L2]$

L2 is not a regular language. (Shown)