Assignment #1
ToA – 6C

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Pg 2

Q1

(a) Infinite sets

L_1, L_3, L_4

Finite sets

L_2, L_5, L_6, L_7, L_8

(b) $L_2 = \{aabb, abab, abba, baab, baba, bbaa\}$

$L_5 = \{a, b, ab, ba, aa, bb\}$

$L_6 = \{a, b\}$

$L_7 = \{aa, ab, aba, bb\}$

$L_8 = \{aaa, bb\}$

(c) $L_7 L_8 = \{aa, ab, aba, bb\}\{aaa, bb\}$

$= \{aaaaa, aabb, abaaa, abbb, abaaaa, ababb, bbaaa, bbbb\}$

$L_6 L_8 = \{a, b\}\{aaa, bb\}$

$= \{aaaa, abb, baaa, bbb\}$

$L_5 L_8 = \{a, b, ab, ba\}\{aaa, bb\}$

$= \{aaaa, abb, baaa, bbb, abaaa, abbb, baaaa, babb\}$

(d) $L_8^0 = \{\varepsilon\}$

$L_8^1 = \{\} = \phi$

$L_8^2 = \{bb\}$

$L_8^3 = \{aaa\}$

(e) $L_7 \cap L_8 = \{bb\}$

$L_6 \cap L_8 = \{\} = \phi$

$L_5 \cap L_8 = \{bb\}$

$L_1 \cap L_2 = \{aabb, abab, abba, baab, baba, bbaa\}$

$L_3 \cap L_4 = \{\} = \phi$

(f) $\overline{L_1} = \{ x \mid n_a(x) \text{ is odd} \}$

$\overline{L_2} = \{ x \mid n_a(x) \neq 2 \ \& \ n_b(x) \neq 2 \}$

$\overline{L_3} = \{ x \mid n_a(x) \neq 0 \ \& \ n_b(x) \text{ is even} \}$

(g) $L_7 \cup L_8 = \{ aa, ab, bb, aaa, aba \}$

$L_6 \cup L_8 = \{ a, b, aaa, bb \}$

$L_5 \cup L_8 = \{ a, b, ab, ba, aa, bb, aaa \}$

$L_1 \cup L_2 = \{ b, bb, aa, aabb, abab, abba, baab, baba, bbaa, \ldots \}$

$L_3 \cup L_4 = \{ b, ab, bbb, abb, bbbbb, aaab \ldots \}$

(h) $L_7 - L_8 = \{ aa, ab, aba \}$

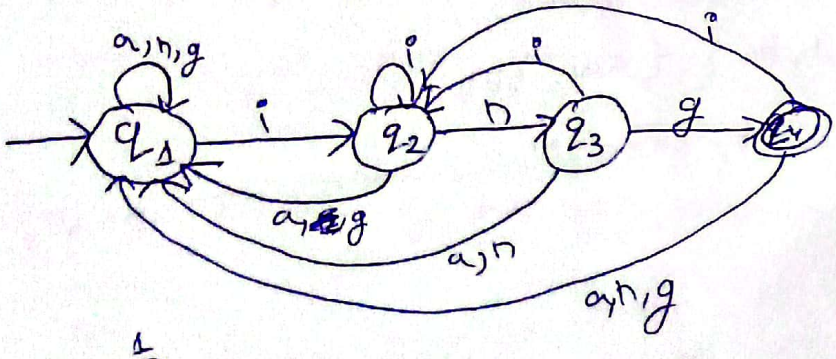
$L_6 - L_8 = \{ a, b \}$

$L_4 - L_5 = \{ abb, aaab, aaaaabb, \ldots \}$

$L_1 - L_3 = \{ bb, aa, aab \ldots \}$

Q2

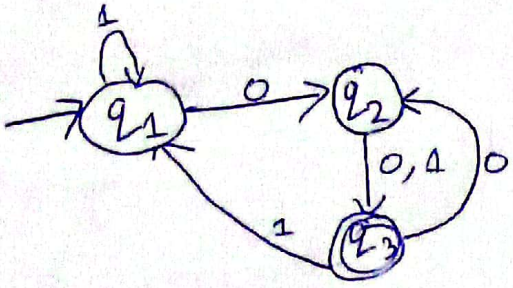
a)



ends with 'ing'

$L = \{ \text{ing}, a\text{ing} \}$

b)



end last digit '0'

$L = \{ 00, 01, 011, 101 \ldots \}$