b) $L_2 = \{ 0^i 1^j \mid i > j \}$

Let L_2 be ~~see~~ regular

$\therefore L_2$ satisfies pumping property

Let k be pumping constant

$s = 0^{k+1} 1^k \quad |s| = 2k+1 > k$

$s = uvw$, u = empty

$v = 0^m \quad m \geq 1,$

$w = 0^{k+1-m} 1^k \quad m \leq k$

$uv^i w = 0^{im} 0^{k+1-m} 1^k$

$= 0^{k+1+(i-1)m} 1^k$

for $i = 0$, it becomes $0^{k+1-m} 1^k$

$m \geq 1$, $\therefore k+1-m \leq k$

$\therefore uv^0 w \notin L_2$

Pumping property is not satisfied.

$\therefore L_2$ is not regular.

d) $L_4 = \{(10)^p 1^q \mid p \geq q\}$

Let L_4 be regular

$\therefore L_4$ satisfies pumping property

Let K be pumping constant

$S = (10)^K 1^K \quad |S| = 3k > k$

$S = uvw$, u = empty

$v = 10$

$w = (10)^{K-1} 1^K$

$uv^i w = (10)^i (10)^{K-1} 1^K$

$= (10)^{K+i-1} 1^K$

At $i = 0$,

$uv^0 w = (10)^{K-1} 1^K$

$K - 1 < K$, $\therefore uv^0 w \notin L_4$

Pumping property not satisfied.

$\therefore L_4$ is not regular.