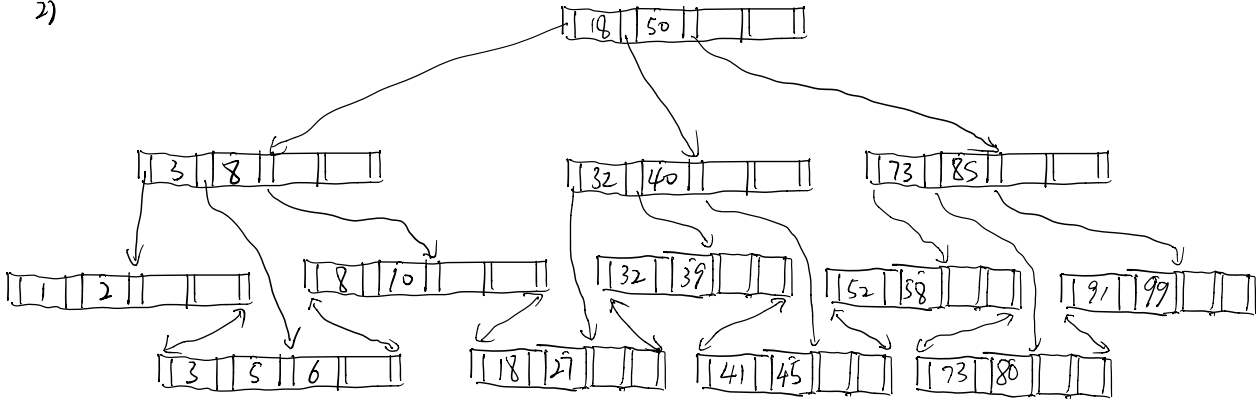


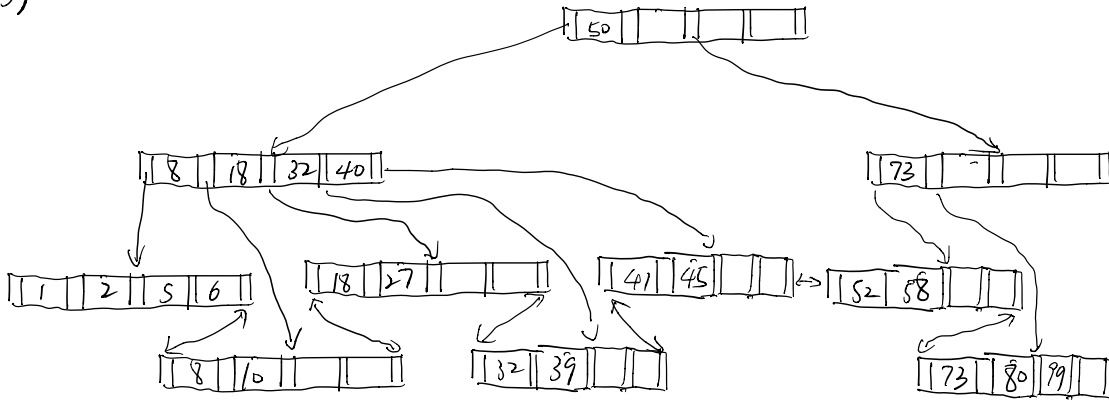
Question 1.

1) Maximum possible number: $(15 \times 100\%)^3 - 18 = 107$

2)



3)



Question 2

1) 2. Use a clustered B+ tree index on attribute P.Q.

Tree-Structured indexes are best for sorted access and range queries.

Hash-based indexes are best for equality selections. Cannot support range searches.

So. 4 and 6 are false.

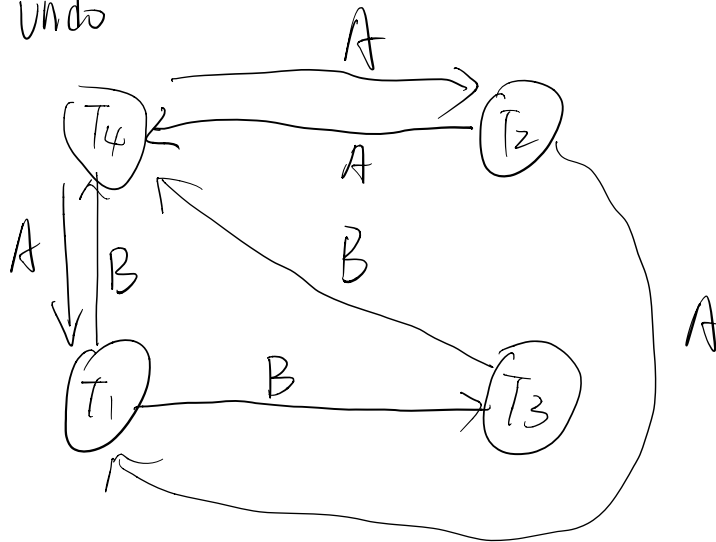
As question shows, only the candidate key P.Q. has the range limitation.

Question 3.

1) T_4 : redo

T_1 : undo

2)



No, there is a cycle in its schedule graph.

3)

Time	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8	t_9	t_{10}	t_{11}	t_{12}
T_1	$R(B)$		$R(A)$								$W(B)$	$W(A)$
T_2		$R(A)$		$W(A)$								
T_3					$R(B)$							
T_4										$W(B)$		
					$R(A)$	$W(A)$	$R(B)$	$W(B)$				

4)

Time	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8	t_9	t_{10}	t_{11}	t_{12}
T_1	$R(B)$	$R(A)$	$W(B)$	$W(A)$								
T_2					$R(A)$	$W(A)$						
T_3							$R(B)$	$W(B)$				
T_4									$R(A)$	$W(A)$	$R(B)$	$W(B)$