**Databases Homework 3**

1:

a: 5 tuples

b: 100,000 pages

c:

i:

Worst case: 100,000 pages to read \* 0.5 milliseconds/per page = 50,000 milliseconds + 50 milliseconds from seek/rotation

= 50,050 milliseconds in worst case

Average Case: 50,000 pages to read \* 0.5 milliseconds/per page = 25,000 milliseconds + 50 milliseconds from seek/rotation

= 25,050 milliseconds in avg case

ii: SSN is the primary key so only one unique value needs to be found, therefore only need to look through one page even in the worst case.

Worst case: 50 ms from seek/rotation + 0.5 from only needing to lookup one page = 50.5 ms

Average Case: 50 ms from seek/rotation + 0.5 from only needing to lookup one page = 50.5 ms

d:

i:

Only need to look at one page per tuple, non-clustered has pointer to page

50 ms seek/rotation + 0.5 page lookup = 50.5 ms per tuple \* 2 tuples

= 101 ms worst case

ii:

50 ms seek/rotation + 0.5 page lookup = 50.5 ms per tuple \* 5000

= 252,500 ms worst case

2:

a: Assuming we split the node into groups of {50,51} and {55,58,58} because of the constraint to give ties to the right node, the value of the number in the parent node could be in the range 52-55, as everything in the left child would be less than and everything in the right child would be greater than or equal to any of those values thus filling the B+ tree requirement.

b: General Strategy: Height 1 nodes, skip first child node and take min of next nodes. Root node: Do the same but zoomed out (find min of middle subtree and right subtree)

B: {13,28} C: {50}, D:{83}, A: {40, 71}

c:

57 Inserted into I

Node I is split. New values of IA (50,55) and IB (57,58,60)

Node C is affected. New values for C is (50,57)

18 Inserted into F

Node F is updated with values (13,17,18,25)

100 Inserted into K

Node K is updated with values (83,88,92,100)

3 Inserted into E

Node E is split. New values of EA (2,3) and EB (4,8,9)

Node B is split. New values for BA (4) and BB (28)

Node A (Root) is split. New values for AA (13) and AB (71)

New root N has values (40)

1 Inserted into EA

Node EA is updated with values (1,2,3)

77 Inserted into J

Node J is split. New values of JA (71,74) and IB (77,78,80)

Node D is affected. New values for D is (77,83)

3:

a: i, iv

b: ii, iv

c: iii