Question 1

M=10000 pages, N=1000 pages, BP = 502,

1. Cost = M \* N + M = 10000\*1000+1000 = 10001000 number of I/O
2. Cost = Scan of outer + #outer blocks \* scan of inner

Where #outer blocks = #of pages of outer / block size

= 10000 + 10000 / (502-2) \* 1000 = 30000 number of I/O

1. Cost = Sort A + Sort B + (A + B)

= 2 \* M \* #passes + 2 \* N \* #passes + M + N

= 2\*10000\*2+2\*1000\*2+10000+1000

= 55000 number of I/O

1. Cost = 2 \* (M + N) + (M + N)

= 3\*(10000+1000)

= 33000 number of I/O

1. Either larger buffer or smaller outer can make the I/O smaller using ‘Block-oriented Nested Loops Join’ algorithm. Thus, we can make B as the outer relation in this algorithm, the number of I/O then becomes 1000 + 1000 / (502-2) \* 10000 = 21000, assuming there are 502 buffer pages available. If even better I/O cost is needed, we can simply increase the buffer page as much as we can.