

analysis:

Read original data:	10,000	I/Os
write runs	1000	I/Os
Read runs	1000	-
Fetch all tuples:	100,000	I/Os
write sorted data	10,000	-
	<u>122,000</u>	I/Os

2a) $R = 120,000$ tp

Block s: $8192 - 80 = 8112$ bt/BK

records: $x + y + z + \text{header} \Rightarrow 40 + 160 + 120 + 32$
 $= 352$ bt/id

$$\left\lfloor \frac{8112 \text{ bt/BK}}{352 \text{ bt/id}} \right\rfloor = 23 \text{ id/BK}$$

$$\text{Files Block} = \left\lceil \frac{120,000 \text{ tp}}{23 \text{ tp/BK}} \right\rceil = \lceil 5217.3 \rceil \text{ BK}$$
$$= \boxed{5218 \text{ BK}}$$

a) Min Memory: $n(n-1) \geq 5218$

$$n^2 - n \geq 5218 \quad | \quad n^2 - n - 5218 \geq 0$$

$$n^2 - n - 5218 \geq 0$$

$$\begin{array}{rcl} 72 \times 72 & = & 5184 \\ 72 \times 73 & = & 5256 \\ 72 \times 71 & = & 5112 \end{array}$$

$$\underline{n \geq 72}$$

b) $I/Os = 4 \times (5218) = 20,872$

c) $\overset{B+}{Total} = 2B_r + 2B_k + T$

$$B_k = B_{kpp} \Rightarrow$$

$$pointers = 10 + 40 = 48 \text{ bt / kpp}$$

$$B_{kpp} : \left\lfloor \frac{5112 \text{ bt}}{48 \text{ kpp}} \right\rfloor = 106 \text{ kpp/BK}$$

$$\therefore \text{total for file} : \left\lceil \frac{120,000 \text{ kpp}}{106 \text{ kpp/B}} \right\rceil = \boxed{711 \text{ BK}}$$

$$\text{Block for kpp} = \underline{711 \text{ BK}}$$

a) 711 I/Os to store all kpp

1. read Block file and : 5184 ~~BK~~ I/O

2. ~~read~~ ^{write} chunk to Memory = 711 I/O

3. ~~read~~ ^{write} to ~~memory~~ ^{in sublist} = 711 I/O

4. Read the sorted sublists of key-pointer-pairs from disk: 5184 I/O's

5. retrieve pointer to file = 120,000 I/O

6. write to disk = 5184

$$= 10,388 + 1422 + 120,000 = \underline{131,790 \text{ I/O}}$$