CSE 102 **Midterm Examination**
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1. This is a closed book examination; one handwritten study sheet is allowed.
2. Please check the entire examination immediately to ensure that your copy has all seven pages.
3. Put your name on all pages of the examination.
4. All questions have equal mark value.
5. Neatness counts.
6. You must clearly show your work; take time to prepare a legible answer.
7. There will be no regrades on examinations written in pencil.
8. Good luck and have fun!

name ______________________________

student id ___________________________

oce or cs102 login ______________________

1.	____________	5.	____________
2.	____________	6.	____________
3.	____________	7.	____________
4.	____________	8.	____________
		total	____________

Disk Drives name ______________________

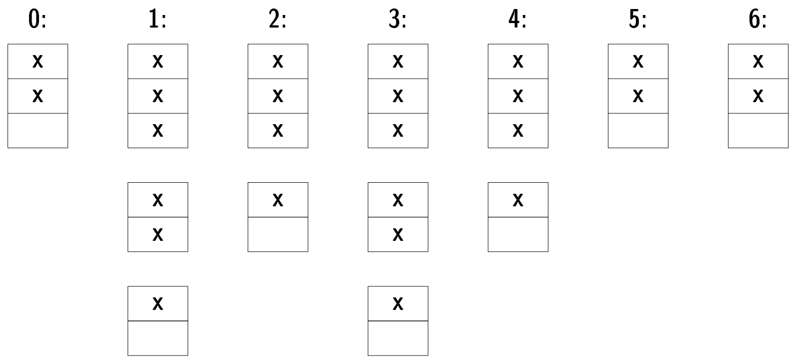
1. Describe the phases of a disk drive seek operation.

2. What run-time characteristic of disk drives causes the internal nodes of a B+tree to be typically much larger than the internal nodes of a binary search tree?

3. What sequence of linear hashing configurations results when the following records are inserted in order into an empty structure? Show a configuration before and after each split operation — be sure to provide the values of *next*, *level*, and the storage utilization just before and after each split operation. Let $S_P = 2$, $S_O = 1$, $\alpha_{max} = 4/5$, and $N = 1$. Use the hash functions $h_i(x) = x \,\%\, 2^i$.

2, 4, 1, 3, 12, 16, 19, 22

4. What are the successful and unsuccessful search lengths for the following linear hashing structure? *N* is five, *level* is one and *next* is two. The x mark designates a stored record.



5. What are typical single record access times, measured in disk accesses, for linear hashing?

6. The following sorted data file consists of 60 byte summary records.

   A A A B B C D D D D D D D D F G H I I J K M O

   Build an order four B+tree index for the file using bottom-up construction; the external nodes contain four summary records. Label the pointers within external nodes with the address of the summary record; the leftmost such pointer has label 0.

7. What are possible heights of an order four B+tree containing 4095 routers built using bottom-up construction?

8. Our key space consists of the interval [1..31]. Our ibim index currently is configured such that *level* is six and *next* is fourty-three. What region and interval are associated with bucket 39?