Quiz 5, Fall 2019
CSCI 4380 DB Sys
Time: 20 minutes

Name 1: _____ RIN: _____
Name 2: _____ RIN: _____
Name 3: _____ RIN: _____

Rules.

- Open book and notes. Do not use any electronic tools including your computer.
- You can talk to anyone in class. If you know the answer, help someone else in class.
- Each quiz must be by at least two and at most three people by people in classroom right now. Put your name on one quiz only.
- Quiz ends on time. No late papers will be accepted. By putting your name above, you agree that you understand this and have contributed to this quiz personally.

Question 1 (10 points). You are given the following information for a relation R. Note that a B-tree index stores key values and pointers to other nodes.

```
TUPLES(R)=10,000,000
PAGES(R)=5,000
A disk page has 8,000 bytes of data available for storing index information
Sizes of attributes for R:
    A: 8 bytes,   B: 14 bytes,   C: 20 bytes,  pointer: 8 bytes
```

What is the size of a B-tree index on `R(B,C,A)`? How many nodes in each level of the index? You can make some simplifying assumptions by disregarding +/-1 additional pointer in each node and assume each node stores maximum amount of key value and pointer pairs in each node. Show your work.

Question 2 (15 points). Suppose you are given an index on `R(B,C,A)` such as the one you calculated in the previous question. The actual size of the index is irrelevant to this question once you write your assumption. For each of the queries below, fill in the table of how the index is searched for this query: (a) how many nodes from internal nodes and (b) which condition is used to scan the leaf nodes.

Write your assumption first: How many levels in the B-tree?

Fill the following:

Query	# internal nodes scanned	Condition used to scan leaf nodes

`SELECT * FROM R`
`WHERE B='SEA' AND`
`C='breeze';`		

`SELECT * FROM R` `WHERE B='SEA' AND A=10;`		

`SELECT * FROM R`
`WHERE B='SEA' AND`
`C>='breeze' AND`
`C<='wind';`		

`SELECT * FROM R`
`WHERE B>='LAND' AND`
`B<='breeze';`
`AND C='wind'`		

`SELECT * FROM R` `WHERE A=10;`		