

Date:

Name 1:

Name 2:

Assume we have two relations: $R(a,b)$ with primary key a and $S(a,c,d)$ with primary key (a,c) and foreign key constraint a references R .

We are given the following queries:

```
SELECT b, count(*) FROM
R
WHERE b >= 5
GROUP BY b
HAVING count(*) > 10;
```

```
SELECT a FROM
R NATURAL JOIN S
WHERE b >= 5;
```

Assume:

- the values of b range from 0 to 9, and are equally distributed,
- most values of a are expected to appear in S

For each query:

1. Construct a parsing tree from each query (do the selection before the join)
2. For each parsing tree, construct a non-index query evaluation plan.
3. Approximately how much memory, in terms of the size of R and S do we need to be able to perform the query in one pass?
4. Assume that the size of the tuple of R is the same as the size of a tuple in S

You should make the following assumptions:

- All operations can be performed simultaneously (i.e. we need to allocate memory for each operation at the same time)
- Assume that $B(S) > B(R)$