Don't forget to read chapter 13!!!!

1. Exercise 13.1. Consider the following SQL query for our bank database
   
   ```
   select T. branch_name 
   from branch T, branch S 
   where T.assets > S. assets and S.branch_city = "Brooklyn"
   ```
   
   Write an efficient relational-algebra expression that is equivalent to this query. Justify your choice.

2. Exercise 13.2. Assume (for simplicity in this exercise) that only one tuple fits in a block and
   memory holds at most 3 page frames. Show the runs created on each pass of the sort-merge
   algorithm, when applied to sort the following tuples on the first attribute:
   (kangaroo, 17), (wallaby, 21), (emu, 1), (wombat, 13), (platypus, 3), (lion, 8), (warthog, 4), (zebra, 11), (meerkat, 6), (hyena, 9), (hornbill, 2), (baboon, 12).

3. Exercise 13.3. Let relations r1(A, B, C) and r2(C, D, E) have the following properties: r1 has
   20,000 tuples, r2 has 45000 tuples, 25 tuples of r1 fit on one block, and 30 tuples of r2 fit on one
   block. Estimate the number of block transfers and seeks required, using each of the following
   join strategies for r1 \( \times \) rw:
   
   i. nested-loop join
   
   ii. block nested-loop join
   
   iii. merge join
   
   iv. hash join