CS W186 - Spring 2024
Exam Prep Section 4
Buffer Management and Relational Algebra

1 Buffer Management

We're given a buffer pool with 4 pages, which is empty to begin with. Answer the following questions given this access pattern:

A B C D E B A D C A E C

1. What is the hit rate for MRU?

2. In order of when they were first placed into the buffer pool, what pages remain in the buffer pool after this sequence of accesses?

3. What is the hit rate for clock?

4. Which pages are in the buffer pool after this sequence of accesses?

5. Which pages have their reference bits set?

6. Which page is the arm of the clock pointing to?

2 Relational Algebra

1. Consider two relations with the same schema: R(A,B) and S(A,B). Which one of the following relational algebra expressions is not equivalent to the others?

   (A) $\pi_{R.A}((R \cup S) - S)$
   (B) $\pi_{R.A}(R) - \pi_{R.A}(R \cap S)$
   (C) $\pi_{R.A}((R - S) \cap \pi_{R.A}(R)$
   (D) They are all equivalent.

2. The CS 186 TAs have decided to go into real estate! All of the information we need is described by the following schema, where the primary key of each table is underlined:

   Homes(<u>home_id</u> int, city text, bedrooms int, bathrooms int, area int)
   Transactions(home_id int, buyer_id int, seller_id int,
                   transaction_date date, sale_price int)
   Buyers(buyer_id int, name text)
   Sellers(<u>seller_id</u> int, name text)

   Write the relational algebra plan to find the duplicate-free set of id's of all homes in Berkeley with at least 6 bedrooms and at least 2 bathrooms that were bought by "Bobby Tables".