Q1 LRU

2 Points

For the following questions, assume the following page access pattern:

APROPERCOPPERCOFFEEPOT

Assume you start off with 4 empty buffer frames, and that, when a page is requested, it is brought in and pinned as normal, and then immediately unpinned before the next page request.

Q1.1

Using LRU replacement policy, how many buffer pool hits are there?

Q1.2

At the end of this access pattern which pages are left in the buffer pool?

А
✓ P
• 0
✓ E
R
С
F
Т

Q2 MRU

2 Points

For the following questions, assume the following page access pattern:

APROPERCOPPERCOFFEEPOT

Assume you start off with 4 empty buffer frames, and that, when a page is requested, it is brought in and pinned as normal, and then immediately unpinned before the next page request.

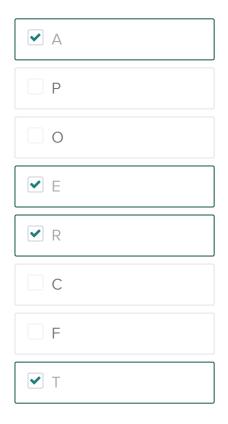
Q2.1

Using MRU replacement policy, how many buffer pool hits are there?

9				
9				

Q2.2

At the end of this access pattern which pages are left in the buffer pool?



Q3 Clock

3 Points

For the following questions, assume the following page access pattern:

APROPERCOPPERCOFFEEPOT

Assume you start off with 4 empty buffer frames, and that, when a page is requested, it is brought in and pinned as normal, and then immediately unpinned before the next page request.

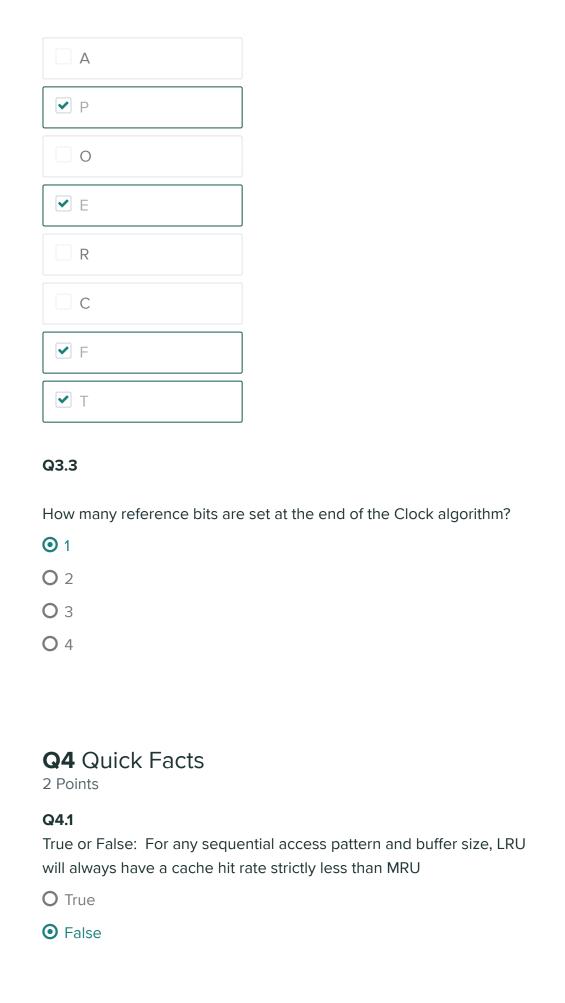
Q3.1

Using Clock replacement policy, how many buffer pool hits are there?



Q3.2

At the end of this access pattern which pages are left in the buffer pool?



Q4.2

Which of the following statements are true? There may be zero, one, or more than one correct answer.



Α	page	in	a pool	cannot	be	requested	multiple	times
$\overline{}$	page	111	a pooi	Carmot		requested	manupic	LITTICS

	Clock	policy is	s a	aood	approximation	for	MRU
	0.00.0	P 0 11 0 11		9000	approximation		



Q5 Relational Algebra

3 Points

```
CREATE TABLE Users(

uid INTEGER PRIMARY KEY,

uname TEXT,

country TEXT);

CREATE TABLE Artists(

aid INTEGER PRIMARY KEY,

aname TEXT);

CREATE TABLE Albums(

albumid INTEGER PRIMARY KEY,

albumname TEXT,

genre TEXT,

aid INTEGER,

FOREIGN KEY (aid) REFERENCES Artists(aid));
```

```
CREATE TABLE Ratings(
uid INTEGER,
aid INTEGER,
rating INTEGER,

PRIMARY KEY (uid,aid),

FOREIGN KEY (uid) REFERENCES Users(uid),

FOREIGN KEY (aid) REFERENCES Artists(aid));

CREATE TABLE Follows(
uid INTEGER, /* Id of the user doing the following */
fuid INTEGER, /* Id of the user being followed */

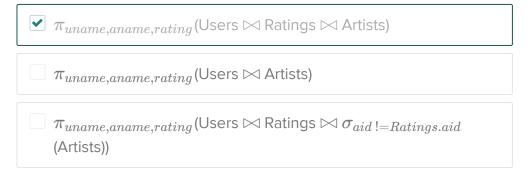
FOREIGN KEY (uid) REFERENCES Users(uid),

FOREIGN KEY (fuid) REFERENCES Users(uid));
```

There may be zero, one, or more than one correct answer.

Q5.1 Rated Artists

For each instance of an artist rated by a user, return the name of the user, the name of the artist, and the rating.



Q5.2 Tuvan Throat Singing & Modern Pan Flute

Find the name of the artists who have albums of genre 'Tuvan Throat Singing' and 'Modern Pan Flute Music'.

	$\pi_{Artists.aname}$ (($\sigma_{Albums.genre}$ ='Tuvan Throat Singing' (Albums))) \cap $\pi_{Artists.aname}$ (($\sigma_{Albums.genre}$ ='Modern Pan Flute Music' (Albums)))
~	$\pi_{Artists.aname}$ (($\sigma_{Albums.genre}$ ='Tuvan Throat Singing' (Albums)) \bowtie Artist $\cap \pi_{Artists.aname}$ (($\sigma_{Albums.genre}$ ='Modern Pan Flute Music' (Albums)) \bowtie Artists)
	$\pi_{Artists.aname}$ ((
	$\sigma_{Albums.genre=`TuvanThroatSinging`\land Albums.genre=`ModernPanFluteMv}$ (Albums)) \bowtie Artists)
	$\pi_{Artists.aname}$ (($\sigma_{Albums.genre=`TuvanThroatSinging'}$ (Albums))) \cup
	$\pi_{Artists.aname}$ (($\sigma_{Albums.genre}$ -' $ModernPanFluteMusic$ ' (Albums)))
etu	rn the names of artists who have not been rated by any user.
	rn the names of artists who have not been rated by any user. $\pi_{aname}(\pi_{aid,aname}(\text{Artists}) - \pi_{aid,aname}(\text{Artists} \bowtie \text{Users}))$
✓	$\pi_{aname}(\pi_{aid,aname}(ext{Artists}) - \pi_{aid,aname}(ext{Artists} times ext{Users}))$

Somya Mohindra	
TOTAL POINTS 12 / 12 pts	
QUESTION 1 LRU	2 / 2 pts
QUESTION 2 MRU	2 / 2 pts
QUESTION 3 Clock	3 / 3 pts
QUESTION 4 Quick Facts	2 / 2 pts
QUESTION 5 Relational Algebra	3 / 3 pts

STUDENT