# Project 03: [Page Replacement Algorithms](http://williamstallings.com/COA/Animation/Links9e.html)

**Due on 11/12/2018**

1) (Run the simulation at [Page Replacement Algorithms](http://www.ecs.umass.edu/ece/koren/architecture/PReplace/))

Provide a sequence of 15 page references that can show the following. Provide the page frame number(s) that satisfy that condition.

Page references:

Hit Rates for different replacement policies:

|  |  |  |  |
| --- | --- | --- | --- |
| **Page Frames**  | **LRU** | **FIFO** | **OPTIMAL** |
| 1 |   |   |   |
| 2 |   |   |   |
| 3 |   |   |   |
| 4 |   |   |   |
| 5 |   |   |   |
| 6 |   |   |   |
| 7 |   |   |  |
| 8 |   |   |   |

1. LRU is better (greater hit ratio) than FIFO

Page Frame =

1. LRU and FIFO are equal

Page Frame =

(iii) LRU is performs worse than FIFO

Page Frame =

(iv) OPTIMAL has same hit ratio as LRU

Page Frame =

(v) All the three have the same hit ratio other than 1 page frame

Page Frame =

2) (Run the simulation at  [More Page Replacement Algorithms](http://www.ecs.umass.edu/ece/koren/architecture/RepPolicies/%22%20%5Ct%20%22_blank))

**Note: If you couldn’t run the Java Applet for the above simulator, assume k=25 and run the same simulator as in the problem 1.**

* **When k>input sequence length, LRU-k = LRU.**
* **Run 3 replacement algorithm only: FIFO, LRU, and Optimal**
* **Ignore 2.1 (b)**

2.1. Use the following input sequence. 1 1 1 2 2 3 4 1 4 5 6 9 8 0 1 2 3 5 6 23 6 6 6 7. Use k=2, page frames as 3.

1. List the hit rates in all the different replacement algorithms and find which algorithms form the lower and upper bounds.

|  |  |
| --- | --- |
| Replacement Algorithm | Hit Ratio  |
| FIFO |  |
| Random |  |
| LRU |  |
| LFU |  |
| LRU-k |  |
| Optimal |  |

The \_\_\_\_\_\_\_\_\_\_ algorithm forms the upper bound for page replacement.

The \_\_\_\_\_\_\_\_\_\_ algorithm can be the lower bound.

1. How different is LRU-k from LRU. How does the value of k affect the LRU-k result? Is there an optimal number?

|  |  |
| --- | --- |
| k value | Hit Ratio |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 5 |  |

2.2. Use the following input sequence. 0 1 2 3 4 5 6 7 8 16 17 9 10 11 12 28 29 30 8 9 10 4 5 12 4 5. Find the page frame numbers for each of the following. List the optimal values for each case.

FIFO performs better than LRU.

At Page frame:

FIFO =

LRU =