CS323 – Exercises
Week 7
4 April 2019

Exercise 1:

Assume a machine in which 4 page frames are available, and in which memory is initially empty. Consider the following reference string of memory accesses to pages:
1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5
How many page faults will occur with the following replacement algorithms? Do not count the initial 4 page faults to bring pages 1 to 4 in memory. Briefly explain your answer.
   a) OPT
   b) LRU
   c) FIFO
   d) CLOCK

Exercise 2:

Assume that you have a page-reference string for a process with *m* frames (initially all empty). The page- reference string has length *p*; *n* distinct page numbers occur in it. Answer these questions for any page- replacement algorithms:

   a. What is a lower bound on the number of page faults?

   b. What is an upper bound on the number of page faults?

Exercise 3:

Consider a demand-paged computer system where the degree of multiprogramming is currently fixed at four. The system was recently measured to determine utilization of CPU and the paging disk. The results are one of the following alternatives. For each case, what is happening? Can the degree of multiprogramming be increased to increase the CPU utilization? Is the paging helping?
   a) CPU utilization 13 percent; disk utilization 97 percent
   b) CPU utilization 87 percent; disk utilization 3 percent
   c) CPU utilization 13 percent; disk utilization 3 percent