

## Extra Homework Problems, 4/9/07, Operating Systems

A. The following logical addresses are written in hexadecimal notation, with each page having size 4 KB. Write down the page on which each address occurs (again in hexadecimal notation).

- (a) 56A42
- (b) A2799
- (c) 0130D
- (d) A280C

B. Assume that there are 3 frames available for the process, and consider the reference string

1, 2, 5, 3, 1, 2, 1, 1, 4, 5, 0, 2, 1, 2, 3, 5, 3, 0

- (a) Use the FIFO (first-in, first-out) algorithm to determine when the page-faults occur for this reference string. Keep track of the page frames at all times. Show your work.
- (b) Use the optimal page replacement algorithm to determine when the page-faults occur for this reference string. Keep track of the page frames at all times. Show your work.
- (c) Use the LRU (least-recently-used) algorithm to determine when the page-faults occur for this reference string. Keep track of the page frames at all times. Show your work.
- (d) Use the second-chance algorithm to determine when the page-faults occur for this reference string. Keep track of the page frames and their reference bits at all times. Show your work.

C. Assume that there are 3 frames available, and consider the following reference string, where a  $W$  superscript means that the given page was written to.

1,  $2^W$ , 5,  $3^W$ , 1,  $2^W$ , 1,  $1^W$ , 4, 5, 0, 2, 1,  $2^W$ ,  $3^W$ , 5, 3, 0

Use the enhanced second-chance algorithm to determine the page faults for this reference string. Keep track of the page frames and their reference and dirty bits at all time. Show your work.