CS 162, Fall 1992
Midterm 1
Professor A. Smith

Problem #1

Explain the difference between a process and a thread. (10 points)

Problem #2

This question is multiple choice. Please place your answers at the bottom.(22 points)

i. A typical rotation time for a magnetic disk is:
A)1.5 ms B)15 ms C)15 microsec. D)5 ms

ii. A typical transfer rate for high performance reel to reel tape is:
A)100KB/sec. B)500KB/sec. C)1.25KB/sec. D)4MB/sec.

iii. The width of an interrecord gap on reel to reel magnetic tape is approximately:
A) 0.1 inch B) 0.6 inch C) 1.1 inches D) 3 inches E) 0.01 inch

iv. The read/write speed of an Exabyte tape is approximately:
A) 10KB/sec. B) 50KB/sec. C) 200KB/sec. D) 1MB/sec. E) 5MB/sec.

v. A typical average seek time for a magnetic disk is:
A) 1usec B) 15usec C) 1ms. D) 15ms.

vi. The maximum storage capacity of an IBM type cartridge tape is approximately:
A) 10MB. B) 50MB. C) 200MB D) 1GB E) 5GB F) 10GB

vii. Writing a read/write optical disk takes X as long as reading it:
A) the same: B) twice C) half D) ten times

viii. The record size for a line printer is:
A) 80 bytes B) 120 bytes C) 132 bytes D) 144 bytes E) 212 bytes.

ix. A typical number of tracks per inch on the surface of a platter for a magnetic disk is:

A) 10 B) 100 C) 1000 D) 10000 E) 100000

x. A typical tape speed for a high performance tape drive using reel to reel tape is:
A) 7.5ips B) 50ips. C) 200ips. D) 500ips.

xi. The ratio of the capacity of a DAT tape to a 12" reel to reel tape recorded at 1600bpi with maximum block size is roughly:
A) 0.1 B) 1.0 C) 5.0 D) 10.0 E) 20.0 F) 50.0 G) 100.0

Problem #3

Assume that you have a page that consists of 16 words. The TLB is set associative with 2 sets and two elements/set; i.e. it is 2-way set associative and has a total size of 4. The TLB uses LRU replacement per set. Memory holds 4 pages. Assume that the virtual address is 20 bits long. The following is the sequence of memory addresses referenced (work addresses) in hexadecimal:
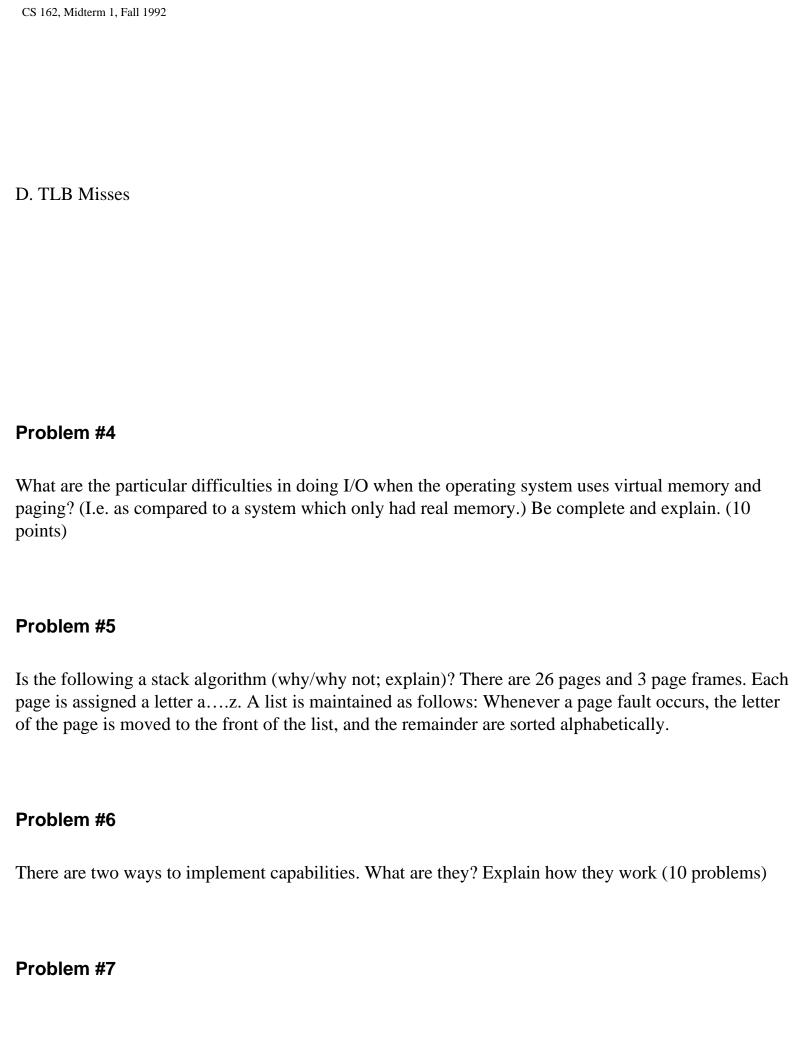
13A41 13A35 13A27 13A1A 13A4C 13A32 13A58 13A49 13A32 13A29 13A10 13A5F

For parts A,B and C of this question, give the number of page faults for the given page replacement algorithm. For part D, give the number of TLB misses. Show your work - you will not receive credit if your work is not shown, or if it does not show how you got your answer. (28 points)

A. LRU

B. FIFO

C. OPT (MIN)

D. TLB Misses

Problem #4

What are the particular difficulties in doing I/O when the operating system uses virtual memory and paging? (I.e. as compared to a system which only had real memory.) Be complete and explain. (10 points)

Problem #5

Is the following a stack algorithm (why/why not; explain)? There are 26 pages and 3 page frames. Each page is assigned a letter a….z. A list is maintained as follows: Whenever a page fault occurs, the letter of the page is moved to the front of the list, and the remainder are sorted alphabetically.

Problem #6

There are two ways to implement capabilities. What are they? Explain how they work (10 problems)

Problem #7

What is the inference control problem? Give an example. Explain why it is such a difficult problem to solve. (10 problems)