1 Virtual Memory Performance

On a system with a memory access time of 38 cycles on which the CPU runs at 3.2 GHz clock and the transfer of a page from hard disk takes 10ms, how large can the probability of a page fault be if we want the effective memory access time to be within 5% of the minimum?

2 Demand Paging

On a system with demand paging where the memory access time is 100 ns, servicing a page fault takes 8 ms if an empty page is available or the replaced page is not dirty, and it takes 20 ms if the replaced page is dirty. What is the maximum acceptable page fault rate if 70% of the page faults require the replacement of a dirty page and the effective access time must be no more than 200 ns?

3 Reentrant Calls

When executing system or library calls from multi-threaded code, it is important to know which calls are re-entrant and which are not.

a) What is the meaning of re-entrant?

b) How does a re-entrant call behave differently from a call that is not re-entrant?

c) Why is this an important consideration for multi-threaded code?