**Introductory to Operating Systems**

Name and ID \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Worksheet #12**

Q1. A paging system is experiencing a page fault rate of 1 in 1 million page references. 20% of the time that a page fault occurs, an empty frame is not available and frame replacement is needed. When frame replacement is needed, 60% of time the frame has been modified and it takes 25 milliseconds to service the page fault, in contrast it takes 15 milliseconds when the frame to be replaced has not been modified. Whenever frame replacement is not needed it takes 10 milliseconds to service the page fault. It takes 150 nanoseconds to reference a physical memory location and we can neglect the time that it takes to access the page table.

Calculate the effective memory access time for this system under these conditions. Clearly indicate intermediate steps.