HW - 3.2

#### **3.{41,42,45,46,47}**

**41.**

Address space per process 65536 bytes/ each page 4096, 2^16/2^12 = 2^4 = 16 pages available. 32768/4096( 8 pages ) + 16386/4069 ( 5 pages ) + 15870/4096 ( 4 pages ) = 17 pages needed. The program does not fit when pages 4096 bytes. 65536/512 = 128 pages when page size 512 bytes, 32768/512 + 16386/512 + 15870/512, 64 + 33 + 31 = 128 needed and 128 available.

**42**. 60 seconds = instruction total\*1ms + 15000\*2ms, total time = instruction time + page fault time

60 = 30 + 30 ; total time = i\*1ms + (1/2)\*15000\*(2ms\*) = 30 + 15 = 45s

**45.** The difference between internal fragmentation and external fragmentation is internal fragmentation happens in paging while external fragmentation happens in segmented systems. Internal fragmentation is when the last unit allocated is not fully utilized and external fragmentation is the space wasted between allocated units.

**46.** No, the TLB has search key that uses segment number and virtual page number, only one look up.

**47. p252**

a. 14 + 3 = 17

b. Page fault minor

c. 28 on disk

d. Page fault major load from disk