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ECEC 353  
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Homework #6

**The following questions refer to a 16-bit Intel CPU running in real mode with 16 byte segment paragraphs.**

1. **What physical memory address does the logical address C19A:4C7F translate to?**With real mode addressing, the segment needs to be shifted by 4 bits (i.e. multiplied by 16), and then added to the offset.

C19A 🡨 Segment ------------- 49562 (decimal) \* 16 = 792,992  
4C7F 🡨 Offset ----------------- 19583 (decimal)

Therefore, logical address C19A:4C7F is referring to the 812,575th Byte (or C661F hex) of physical memory.

1. **You want to access the 960,959th byte of physical memory. Write the full logical address in segment:offset format needed to access this byte in physical memory given that the segment register contains the hexadecimal value DEAD.**Given that the segment register contains DEAD (57005 in decimal), we need to find the value for the offset. This can be done by multiplying 57005 by 16, and then subtracting that from 960,959.

57005 \* 16 = 912,080  
960,959 – 912,080 = 48879

So, the 960,959th Byte of physical memory can be accessed with logical address DEAD:BEEF

1. **You want to access the 818,768th byte of physical memory. Is it possible to reach this value from some segment using the hexadecimal offset 2A30? If so, what value would you load into the segment register? Write the full logical address in segment:offset format needed to access this byte in physical memory. Use hexadecimal.**

With an offset value of 2A30, finding the segment register value is similar to the previous problem.  
  
2A30 🡪 10800….  
Segment needs to be … (818,768 – 10800) / 16 => 50498 (C542 in hex)

So, it is possible to reach the 818,768th byte of physical memory with the logical address C542:2A30

1. **You want to access the 818,768th byte of physical memory. Is it possible to reach this value from some segment using the hexadecimal offset FC10? If so, what value would you load into the segment register? Write the full logical address in segment:offset format needed to access this byte in physical memory. Use hexadecimal.**

FC10 🡪 64,528  
Segment needs to be … (818,768 – 64,528) / 16 => 47,140 (B824 in hex)

So, it is possible to reach the 818,768th byte of physical memory with the logical address B824:FC10

1. **You want to access the 674,842nd byte of physical memory. Is it possible to reach this value from some segment using the hexadecimal offset 1F7C? If so, what value would you load into the segment register? Write the full logical address in segment:offset format needed to access this byte in physical memory. Use hexadecimal.**

1F7C 🡪 8060….  
Segment needs to be … (674,842 – 8060) / 16 => 41,673.875  
  
The segment address must be an integer number. You cannot round down or up because if you do, you will not be accessing the desired byte address. So, given a hex offset of 1F7C, you cannot access the 674,842nd byte of physical memory.