Please do not read the questions until your class starts, and do not share this document.

There will be no marks for answering these questions correctly. On the other hand, if we find that you knew the questions and/or the answers before your class you will receive zero participation marks for that tutorial.

In all questions below, you need to choose **one answer**.

Please note that in these questions, KB means 1024 byte and MB means 1024\*1024 bytes.

Q1. Consider the difference between logical and physical addresses. Which of the following statements is INCORRECT?

A. A process can never accesses a variable by the variable's logical address  
B. A logical address refers to a location in an abstract space  
C. A logical address is an input to the memory management unit (MMU)  
D. Physical addresses are generated by the memory management unit (MMU)  
E. A physical address refers to a location within the hardware

Q2. Why are page sizes always powers of 2?

A. Because the total amount of memory is a power of 2  
B. To reduce internal fragmentation  
C. To facilitate mapping between page number and frame number  
D. It allows efficient extraction of page number and offset  
E. It allows the logical address space to fit within the physical address space

Q3. Consider six memory partitions: i: 300 KB, ii: 600 KB, iii: 350 KB, iv: 200 KB, v: 750 KB, vi: 125 KB.  
When using the best-fit algorithm to place processes of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB, how much space is left in each partition?

A. i: 185 KB, ii: 100 KB, iii: 150 KB, iv: 200 KB, v: 17 KB, vi: 125 KB  
B. i: 300 KB, ii: 100 KB, iii: 350 KB, iv: 0 KB, v: 17 KB, vi: 10 KB  
C. i: 300 KB, ii: 242 KB, iii: 150 KB, iv: 200 KB, v: 135 KB, vi: 125 KB  
D. i: 300 KB, ii: 100 KB, iii: 150 KB, iv: 85 KB, v: 17 KB, vi: 125 KB  
E. i: 100 KB, ii: 100 KB, iii: 350 KB, iv: 200 KB, v: 17 KB, vi: 10 KB

Q4. Assuming a 1-KB page size, what are the page numbers and offsets for the following address references: (i) 42095, (ii) 215201  
A. i: page = 42, offset = 95. ii: page = 210, offset = 161  
B. i: page = 42, offset = 95. ii: page = 215, offset = 201  
C. i: page = 41, offset = 95. ii: page = 210, offset = 201  
D. There is not valid answer, since i or ii point outside of memory boundaries  
E. i: page = 41, offset = 111. ii: page = 210, offset = 161

Q5. Consider a logical address space of 256 pages with a 4-KB page size, mapped onto a physical memory of 64 frames  
i. How many bits are required in the logical address?  
ii. How many bits are required in the physical address?

A) i: 20 bits. ii: 18 bits  
B) The question has no valid answer, because in this case logical and physical spaces are incompatible  
C) i: 12 bits. ii: 12 bits  
D) i: 8 bits. ii: 6 bits  
E) i: 18 bits. ii: 20 bits

Q6. Consider a computer system with a 32-bit logical address and 4-KB page size. The system supports up to 512 MB of physical memory. How many entries are there in each of the following?  
i: A conventional, single-level page table  
ii: An inverted page table

A) i: 220 entries. ii: 218 entries  
B) The question has no meaningful answer since the page table will not fit in memory.  
C) i: 220 entries. ii: 220 entries  
D) i: 232 entries. ii: 229 entries  
E) i: 220 entries. ii: 217 entries