

CMPE283 – Virtualization
Midterm Exam

Name: _____

This exam is governed by the rules posted in the class Canvas discussions forum.

Select / provide the best answer for each question.

1. (3 points for each correct answer) For each of the following exit types, provide an instruction that would cause the exit, along with any assumptions or conditions required for the exit to happen. If the exit type is not caused by an instruction, answer "No instruction", but still provide any assumptions required for the exit to happen.

- A. VMREAD (Intel VMX exit reason 23)
- B. Exception or non-maskable interrupt (Intel VMX exit reason 0)
- C. CPUID (Intel VMX exit reason 10)
- D. I/O Instruction (Intel VMX exit reason 30)
- E. Control register access (Intel VMX exit reason 28)

2. (5 points) _____ True or False – All VMEXITs require the VMM to emulate at least one guest VM instruction.

3. (5 points) How many levels of the page directory/page table hierarchy does the does the x86 processor traverse when translating a virtual address in 64 bit mode?

- A. Always 4
- B. Always 3
- C. Sometimes less than 4
- D. None of the above

4. (5 points) _____ True or False – The processor must always reload CR3 when a VMEXIT occurs.

5. (5 points) _____ True or False – All VMEXITs occur due to the guest VM executing a prohibited or sensitive instruction.

6. (20 points) Give an example of two x86 instructions that are sensitive but not privileged and explain why the instructions cause problems if allowed to execute without a VMM.

7. (15 points) Describe what happens in the processor and VMM when a VM exit occurs. Be specific and thorough.

8. (10 points) Describe how global pages are used and why they are beneficial to an operating system.