New York University
CSCI-UA.0202-003: Operating Systems (Undergrad): Spring 2025

Quiz 5

- Write your full name on both:

    - the bubble sheet in the "Name" field
    - the quiz booklet

- Write your NYU NetID on the quiz booklet and the bubble sheet in the "ID" field

- Use a #2 pencil to fill in your answers on the bubble sheet

- This quiz contains 6 questions only. Each question has choices from A to D

- Fill the bubbles completely by darkening the entire circle, as shown in the example

- Only mark answers for questions 1-6. Do not mark any bubbles beyond question 6

- Choose only one answer per question

- Submit your bubble sheet together with your exam booklet

Name:

NetId:

1. When a disk interrupt occurs in an operating system like WeensyOS, what is typically stored in the "trap frame"?
   (a) The current state of CPU registers including %rip, %rsp, and %eflags
   (b) The disk sector data that caused the interrupt
   (c) A pointer to the interrupt handler function
   (d) The contents of the process's page table

2. In port-mapped I/O, what are the functions of `outb` and `inb` instructions?
   (a) To manage process thread priorities
   (b) To enable and disable peripheral devices
   (c) To allocate and deallocate memory buffers
   (d) To read and write bytes to specific I/O port addresses

3. What causes a user-level thread to call `yield()` in a cooperative threading system?
   (a) The thread voluntarily deciding it has run long enough or encounters a blocking operation
   (b) Another thread with higher priority becoming ready
   (c) The operating system scheduler
   (d) A hardware timer interrupt

4. What is the primary advantage of using interrupts for device I/O compared to busy waiting?
   (a) Interrupts require less memory overhead
   (b) Interrupts are always faster than busy waiting
   (c) Interrupts provide guaranteed timing for data transfer
   (d) Interrupts allow the CPU to perform other tasks while waiting for I/O completion

5. Which I/O pattern can lead to "livelock" in a system?
   (a) High rate of interrupts consuming 100% CPU time handling them
   (b) Multiple processes competing for the same I/O device
   (c) Excessive polling of device status registers
   (d) Using DMA for large file transfers

6. What happens when a synchronous I/O operation is issued by a user process?
   (a) The operation is queued for later execution
   (b) The operation is handled by a separate thread
   (c) The process is blocked (suspended) until the operation completes
   (d) The process continues execution and is notified later when the operation completes