Dept. Computer Science	**Operating Systems**
Vrije Universiteit	**26.03.2008**

1a Draw a picture of a process in memory. What do brk() and sbrk() do? *5pt*

1b Explain how a buffer overflow works. *5pt*

2a What are Coffman's 4 conditions for deadlock? *5pt*

2b Write pseudocode to show how to solve the producer-consumer problem using semaphores. *10pt*

2c Explain how monitors provide mutual exclusion. Does MINIX3 use monitors? *5pt*

3a Where is the process table located, and what information does it store? *5pt*

3b Describe 4 different kinds of process scheduling in detail. *5pt*

3c What kind of process scheduling does MINIX3 use? **Be precise.** *5pt*

4a Describe the boot procedure for a computer with multiple partitions. *5pt*

4b Draw a picture of the resulting memory layout after MINIX3 has been loaded from the disk into memory *5pt*

4c How does the boot process work with diskless workstations? *5pt*

5a What is a RAM Disk? What is it commonly used for? *5pt*

5b Explain the functionality and implementation commonalities of /dev/ram, /dev/mem, /dev/kmem, /dev/null, and /dev/zero *5pt*

6a Describe Swapping, Paging, and Segmentation in detail. What are the advantages/disadvantages of each? *10pt*

6b Describe the tradeoffs of using a Combined vs. Separate I&D Space. What does MINIX3 use? *5pt*

6c What is the function of a Memory Management Unit (MMU)? Make a sketch of how it works. *5pt*

***Grading:** The final grade is calculated by adding the scores per question (maximum: 90 points), and adding 10 bonus points. The maximum total is therefore 100 points.*