Dept. Computer Science	**Operating Systems**
Vrije Universiteit	**25.03.2009**

1a Please list 4 methods of deadling with deadlocks. Which method does MINIX 3 use? *5pt*

1b Give a solution to the producer-consumer problem using (regular) semaphores. *5pt*

1c Give a solution to the producer-consumer problem using binary semaphores. *10pt*

2a Explain the tradeoffs of tracking memory allocation with bitmaps vs. linked lists. *5pt*

2b Describe five algorithms that determine appropriate holes for memory allocation. Which algorithm does MINIX 3 use? *10pt*

2c Explain the utility and structure of Inverted Page Tables. *5pt*

3a Describe the usage of synchronous vs. asynchronous message passing in MINIX 3. *5pt*

3b Explain how a pipeline is implemented between a parent and child process. *10pt*

3c What is a Magic Number? Please name three parts of MINIX 3 in which they are used. *5pt*

4a Explain the significance of a special file's major and minor device number. **Be precise.** *5pt*

4b What are lost clockticks? How are they handled by the Clock interrupt handler? *5pt*

5a Explain how the *fsck* utility works. *5pt*

5b Explain the purpose and usage of the *filp* table. *5pt*

6a What is the difference between ACL and capability-based security?. *5pt*

6b Provide a few brief examples of subverting security using covert channels. *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.*