FEW, Division W&I
Vrije Universiteit

Operating Systems
27 March 2002

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All questions count equally. The final grade is the sum of the separate parts.
Voor Nederlands, Z.O.Z.

1. A UNIX program begins as follows

```
main() {
int fd1, fd2;
char buf[1000];
     close(0);
     close(1);
     close(2);
     fd1 = open("abc", 0);
     fd2 = open("rst", 0);
     fd3 = open("xyz", 0);
     close(1);
     dup(2);
     read(1, buf, 100);
```

   Is something read? If so, from which file. Assume that abc, rst, an xyz all exist, are readable, and exceed 100 bytes. Also assume that open always returns the lowest available file descriptor.

2. A monitor has two procedures, producer and consumer. Is it possible that a process is executing producer and another process is executing consumer and that both processes are inside the the monitor at the same time? THINK VERY carefully and then explain your answer.

3. Below is code from the MINIX scheduler. Imagine that MINIX user processes are divided into high priority and low priority classes. Give the code for the new scheduler.

```
PRIVATE void pick_proc()
{
  register struct proc *rp;

  if ( (rp = rdy_head[TASK_Q]) != NIL_PROC) {
        proc_ptr = rp;
        return;
  }
  if ( (rp = rdy_head[SERVER_Q]) != NIL_PROC) {
        proc_ptr = rp;
        return;
  }
  if ( (rp = rdy_head[USER_Q]) != NIL_PROC) {
        proc_ptr = rp;
        bill_ptr = rp;
        return;
  }
  bill_ptr = proc_ptr = proc_addr(IDLE);
}
```

4. Explain the essential difference between deadlock avoidance (e.g. the banker's algorithm) and deadlock prevention (e.g., ordered resources).
5. A MINIX program reads from standard input (the keyboard) with the system call n= read(fd, buf, 10). The user types:

   d s <backspace> a t e <enter>

   where <backspace> and <enter> are the corresponding keys.

   (a) What is the value of n in cooked mode?
   (b) What is the value of n in raw mode