

Computer Science and Mathematics
Summer term 2012

Exercises 10

1. Below you find a part of an 8-bit ASCII code table from a web page. What character string is encoded by the bit string given in binary representation as

0100'0011'0100'1000'0100'1001'0100'0101'0100'0110 ?

(The apostrophs are only used for better overview.)

Part of 8-bit ASCII code table:

decimal	hexadecimal	character
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
...

2. Write Java expressions for the following mathematical expressions:

(a) $\frac{a}{b + \frac{1}{c}} + 2.5 \cdot 10^6$

(b) $e^{2k} \cdot \sqrt{x^2 - 2xy + 1}$

(c) $z = \begin{cases} 1 & \text{if } n \text{ is even} \\ 0 & \text{otherwise} \end{cases}$

(Remark: \sqrt{x} is **Math.sqrt(x)**, e^x is **Math.exp(x)**,

a % b gives the rest when dividing **a** by **b**.)

3.(a) Which errors can possibly occur during runtime of the following Java program fragment?

```
int i;
float list[300];
float x, y;
...
/* i, x and y are somehow calculated */
...
list[i] = 1.5 / (x + y);
...
```

(b) Which conditions (to be specified in Java syntax) should be checked to capture these errors before they can cause trouble?

4. The following Java method **f** gets an integer array **x** and the length **n** of the array as arguments:

```
public int f(int x[], int n)
{
    int i, k = 0;
    if (n <= 0) return -1;
    i = 1;
    while (i < n)
    {
        if (x[k] > x[i])
            k = i;
        i = i+1;
    }
    return k;
}
```

(a) What does the method **f** calculate?

(b) What does it give as result if all fields of the array **x** contain the same number, namely, 1?

5. Write an XL (or Java) program which prints all prime numbers between 1 and 1000 on the screen (and no other numbers).

Remark 1: An integer is a prime number if it is larger than 1 and if it is not divisible without rest by any other positive integer except 1 and itself.

Remark 2: $a \% b =$ rest of the division of integer **a** by integer **b** ($0 \leq a \% b < b$).