Worksheet 2

MSc/ICY Software Workshop 1

Assessed Exercise: 10% of the continuous assessment mark.

Submission: Thursday 7 November 2013 12:00 noon

5% late submission penalty per 24 hours or parts thereof. No submission after 24 hours. Tests and comments are mandatory. Submit your . java files via Canvas as a single zip file.

Exercise 1: (Basic, 30%) Write a program that checks for two strings consisting of characters 'a'-'z' and 'A'-'Z' whether they are equivalent irrespective of uppercase or lowercase letters.

Equivalent are:	Not equivalent are:
"test" and "tesT"	"test" and "tea"
"test" and "TEST"	"test" and "tset"
"test" and "TesT"	"test" and "testS"
"TesT" and "tESt"	"test" and ""

Exercise 2: (Basic, 15%) Write a program that prints – without duplicates – the integers between 0 and a maximal number maximum, which are divisible by any of 2, 3, and 5, but not by any of 7 and 11 in increasing order. The numbers should be separated by spaces and only these numbers should be printed. In each line there should be exactly 20 numbers, except for the last which may contain fewer. Test your program for int maximum = 300;. Do not forget to comment what the loop does and why it terminates.

Exercise 3: (Medium, 15%) Bubble sort is a very simple sorting algorithm which swaps adjacent elements in an array which are out of order until the whole array is sorted. E.g.:

```
[4, 3, 6, 1, 9, 2]
     [3, 4, 6, 1, 9, 2]
->
->
     [3, 4, 1, 6, 9, 2]
->
     [3, 4, 1, 6, 2, 9]
     [3, 1, 4, 6, 2, 9]
->
->
     [3, 1, 4, 2, 6, 9]
     [1, 3, 4, 2, 6, 9]
->
->
     [1, 3, 2, 4, 6, 9]
->
     [1, 2, 3, 4, 6, 9]
```

Give a Java implementation of bubble sort using loops.

Exercise 4: (Advanced, 20%) In Linux you can print an overview of the current month by the command cal.

Write a static method that generates a string with a month overview in the following format. Make use of variables max for the number of days in the month (31 in the example) and first for indicating the first day of the month, 0 for Mo, 1 for Tu, 2 for Wed, and so on (i.e., 2 in the example). Take care that the numbers 1 through 9 are aligned to the right as in the example.

```
Mo Tu We Th Fr Sa So
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
```

Exercise 5: (Advanced, 20%) In Linux you can print an overview of a year by the command cal 2013, e.g. Write a corresponding program that generates a string with a year overview for any given year as in the example. Take as additional argument the first day in the year, e.g. 1 for 2013. Note you have to determine whether the year is a leap year, since then February has 29 days.

30 31

50.	м ,	0111		,1101	11 1	CDI	uary	110			ayı	٠.								
									20:	13										
January						February							March							
Mo	Tu	We	Th	$\operatorname{\mathtt{Fr}}$	Sa	Su	Mo	Tu	We	Th	$\operatorname{\mathtt{Fr}}$	Sa	Su	Mo	Tu	We	Th	$\operatorname{\mathtt{Fr}}$	Sa	Su
	1	2	3	4	5	6					1	2	3					1	2	3
7	8	9	10	11	12	13	4	5	6	7	8	9	10	4	5	6	7	8	9	10
14	15	16	17	18	19	20	11	12	13	14	15	16	17	11	12	13	14	15	16	17
21	22	23	24	25	26	27	18	19	20	21	22	23	24	18	19	20	21	22	23	24
28	29	30	31				25	26	27	28				25	26	27	28	29	30	31
		Αı	ori.	L					1	¶ay							June	Э		
Мо	Tu	-			Sa	Su	Мо	Tu	We	Th	Fr	Sa	Su	Мо	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7			1	2	3	4	5						1	2
8	9	10	11	12	13	14	6	7	8	9	10	11	12	3	4	5	6	7	8	9
15	16	17	18		20	21	13	14	15	16	17	18	19	10	11	12	13	14	15	16
22	23	24	25	26	27	28							26	17				21	22	23
	30									30								28		
			Jul	v					Αι	ıgus	st				Ç	Sept	eml	oer		
Мо	Tu		July Th	′	Sa	Su	Мо	Tu		_				Мо		_		oer Fr		Su
Mo 1	Tu 2		•	′	Sa 6	Su 7	Мо	Tu		Th						_				Su 1
		We	Th	Fr 5		7	Mo 5			_	$\operatorname{\mathtt{Fr}}$	Sa	Su			_				
1	2	We 3	Th 4	Fr 5 12	6 13	7 14	5	6	We	Th 1	Fr 2 9	Sa 3 10	Su 4 11	Мо	Tu 3	We	Th 5	Fr 6	Sa 7	1 8
1 8 15	2 9 16	We 3 10 17	Th 4 11 18	Fr 5 12 19	6 13 20	7 14 21	5 12	6 13	We 7 14	Th 1 8 15	Fr 2 9 16	Sa 3 10 17	Su 4 11 18	Mo 2 9	Tu 3 10	We 4 11	Th 5 12	Fr 6 13	Sa 7 14	1 8 15
1 8 15 22	2 9 16 23	We 3 10 17 24	Th 4 11 18	Fr 5 12 19	6 13 20	7 14 21	5 12 19	6 13 20	7 14 21	Th 1 8 15 22	Fr 2 9 16 23	Sa 3 10 17 24	Su 4 11 18	Mo 2 9 16	Tu 3 10 17	We 4 11 18	Th 5 12 19	Fr 6 13 20	7 14 21	1 8 15 22
1 8 15 22	2 9 16	We 3 10 17 24	Th 4 11 18	Fr 5 12 19	6 13 20	7 14 21	5 12 19	6 13 20	7 14 21	Th 1 8 15 22	Fr 2 9 16	Sa 3 10 17 24	Su 4 11 18	Mo 2 9 16 23	Tu 3 10 17	We 4 11 18	Th 5 12 19	Fr 6 13	7 14 21	1 8 15 22
1 8 15 22	2 9 16 23	We 3 10 17 24	Th 4 11 18	Fr 5 12 19	6 13 20	7 14 21	5 12 19	6 13 20	7 14 21	Th 1 8 15 22	Fr 2 9 16 23	Sa 3 10 17 24	Su 4 11 18	Mo 2 9 16	Tu 3 10 17	We 4 11 18	Th 5 12 19	Fr 6 13 20	7 14 21	1 8 15 22
1 8 15 22	2 9 16 23	We 3 10 17 24 31	Th 4 11 18 25	Fr 5 12 19 26	6 13 20	7 14 21	5 12 19	6 13 20	7 14 21 28	Th 1 8 15 22 29	Fr 2 9 16 23 30	Sa 3 10 17 24	Su 4 11 18	Mo 2 9 16 23	Tu 3 10 17	We 4 11 18 25	Th 5 12 19 26	Fr 6 13 20 27	7 14 21	1 8 15 22
1 8 15 22 29	2 9 16 23 30	We 3 10 17 24 31	Th 4 11 18 25	Fr 5 12 19 26	6 13 20 27	7 14 21 28	5 12 19 26	6 13 20 27	7 14 21 28	Th 1 8 15 22 29	Fr 2 9 16 23 30	Sa 10 17 24 31	Su 4 11 18 25	Mo 2 9 16 23 30	Tu 3 10 17 24	We 4 11 18 25	Th 5 12 19 26	Fr 6 13 20 27	7 14 21 28	1 8 15 22 29
1 8 15 22 29	2 9 16 23 30 Tu	We 3 10 17 24 31 Oct	Th 4 11 18 25 tobe	Fr 5 12 19 26 er Fr	6 13 20 27 Sa	7 14 21 28 Su	5 12 19	6 13 20 27	7 14 21 28	Th 1 8 15 22 29	Fr 2 9 16 23 30 er Fr	Sa 10 17 24 31	Su 4 11 18 25 Su	Mo 2 9 16 23 30	Tu 3 10 17 24	We 4 11 18 25	Th 5 12 19 26	Fr 6 13 20 27	7 14 21 28	1 8 15 22 29 Su
1 8 15 22 29 Mo	2 9 16 23 30 Tu 1	We 3 10 17 24 31 Uct	Th 4 11 18 25 tobe	Fr 5 12 19 26 er Fr 4	6 13 20 27 Sa 5	7 14 21 28 Su 6	5 12 19 26 Mo	6 13 20 27 Tu	7 14 21 28 Nov	Th 1 8 15 22 29 Vemb	Fr 2 9 16 23 30 er Fr 1	Sa 3 10 17 24 31 Sa 2	Su 4 11 18 25 Su 3	Mo 2 9 16 23 30	Tu 3 10 17 24 Tu	We 4 11 18 25 Dec	Th 5 12 19 26 Ceml	6 13 20 27 Der Fr	Sa 7 14 21 28 Sa	1 8 15 22 29 Su 1
1 8 15 22 29 Mo	2 9 16 23 30 Tu 1 8	We 3 10 17 24 31 Uct	Th 4 11 18 25 Th 3 10	Fr 5 12 19 26 er Fr 4 11	6 13 20 27 Sa 5 12	7 14 21 28 Su 6 13	5 12 19 26 Mo	6 13 20 27 Tu	7 14 21 28 Nov We	Th 1 8 15 22 29 Th 7	Fr 2 9 16 23 30 per Fr 1 8	Sa 3 10 17 24 31 Sa 2 9	Su 4 11 18 25 Su 3 10	Mo 2 9 16 23 30 Mo	Tu 3 10 17 24 Tu 3	We 4 11 18 25 Dec We 4	Th 5 12 19 26 ceml Th 5	6 13 20 27 Der Fr	Sa 7 14 21 28 Sa 7	1 8 15 22 29 Su 1 8
1 8 15 22 29 Mo 7 14	2 9 16 23 30 Tu 1 8 15	We 3 10 17 24 31 Uct We 2 9 16	Th 4 11 18 25 Th 3 10 17	Fr 5 12 19 26 er Fr 4 11 18	6 13 20 27 Sa 5 12	7 14 21 28 Su 6 13 20	5 12 19 26 Mo 4 11	6 13 20 27 Tu 5 12	7 14 21 28 Nov We 6 13	Th 1 8 15 22 29 7 emil Th 7 14	Fr 2 9 16 23 30 per Fr 1 8 15	Sa 3 10 17 24 31 Sa 2 9 16	Su 4 11 18 25 Su 3 10 17	Mo 2 9 16 23 30 Mo 2 9	Tu 3 10 17 24 Tu 3 10	We 4 11 18 25 Dec We 4 11	Th 5 12 19 26 ceml Th 5 12	6 13 20 27 Der Fr 6 13	Sa 7 14 21 28 Sa 7 14	1 8 15 22 29 Su 1 8 15
1 8 15 22 29 Mo 7 14 21	2 9 16 23 30 Tu 1 8 15	We 3 10 17 24 31 We 2 9 16 23	Th 4 11 18 25 Th 3 10 17 24	Fr 5 12 19 26 er Fr 4 11 18	6 13 20 27 Sa 5 12	7 14 21 28 Su 6 13 20	5 12 19 26 Mo 4 11 18	6 13 20 27 Tu 5 12 19	We 7 14 21 28 Nov We 6 13 20	Th 1 8 15 22 29 Th 7 14 21	Fr 2 9 16 23 30 per Fr 1 8	Sa 3 10 17 24 31 Sa 2 9 16 23	Su 4 11 18 25 Su 3 10 17	Mo 2 9 16 23 30 Mo 2 9 16	Tu 3 10 17 24 Tu 3 10 17	We 4 11 18 25 Dec We 4 11 18	Th 5 12 19 26 Th 5 12 19 19	6 13 20 27 Der Fr	Sa 7 14 21 28 Sa 7 14 21	1 8 15 22 29 Su 1 8 15 22