Computer Programming
Bachelor in Biomedical Engineering
Bachelor in Applied Mathematics and Computing

Course 2020 / 2021

Exercise Sheet 6

Iteration Statements: Nested Loops
– SOLUTIONS –

Content Table

Exercise 1

Write a program that asks the user to introduce two numbers, and then prints the primer numbers between them.

Introduce a number: 120
Introduce another number: 200

The prime numbers between 120 and 200 are: 127 131 137 139 149 151 157 163 167 173 179 181 191 193 197 199

```
clear;
num1 = input('Introduce a number: ');
num2 = input('Introduce another number: ');
fprintf('The prime numbers between %d and %d are: ', num1, num2);
for number = num1:num2
    i = 2;
    while ((i < (number/2)) && (rem(number, i) ~= 0))
        i = i + 1;
    end
    if (i > (number/2))
        fprintf('%d ',number);
    end
end
```

Exercise 2

Write a program that prints all the possible combinations of two vowels in the following manner:

```
aa ae ai ao au
ea ee ei eo eu
ia ie ii io iu
oa oe oi oo ou
ua ue ui uo uu
```

```
clear;
vect = ['a' 'e' 'i' 'o' 'u'];
for first=vect
    for second=vect
        fprintf('%c%c ', first, second);
    end
fprintf('\n');
end
```

Exercise 3

Write a program that asks the user to introduce numbers between 1 and 9, until he/she introduces a negative number. Next, the program prints the number of times that each number between 1 and 9 has been introduced on screen.

```
Introduce a number between 1 and 9: 3
Introduce a number between 1 and 9: 2
Introduce a number between 1 and 9: 7
Introduce a number between 1 and 9: 3
Introduce a number between 1 and 9: 2
Introduce a number between 1 and 9: 5
Introduce a number between 1 and 9: 3
Introduce a number between 1 and 9: -1
Number 1 appears 0 times
Number 2 appears 2 times
Number 3 appears 3 times
Number 4 appears 0 times
Number 5 appears 1 times
Number 6 appears 0 times
Number 7 appears 1 times
Number 8 appears 0 times
Number 9 appears 0 times
```

```
clear;
vect = [];
cont = 0;
number = input('Introduce a number between 1 and 9: ');
while (number >= 0)
    if ((number >= 1) &&(number <=9))
        cont = cont +1;
        vect(cont) = number;
    elseif ((number == 0) || (number > 9))
        disp('Wrong number. ');
    end
    number = input('Introduce a number between 1 and 9: ');
end

for i=1:9
    ntimes = 0;
    for val=vect
        if (val == i)
            ntimes = ntimes +1;
        end
    end
    fprintf('The number %d appears %d times\n', i, ntimes);
end
```

Exercise 4

Write a program that prints dates organized in weeks as displayed in the next example (note that Sunday is considered to be the first day of the week):

```
Introduce the day: 19
Introduce the month: 10
Introduce the year: 2015
Introduce the day of the week (1 to 7): 2

 Tuesday: 20/10/2015
 Wednesday: 21/10/2015
 Thursday: 22/10/2015
 Friday: 23/10/2015
 Saturday: 24/10/2015
Do you want to print the next week(Y/N)? Y

 Sunday: 25/10/2015
 Monday: 26/10/2015
 Tuesday: 27/10/2015
 Wednesday: 28/10/2015
 Thursday: 29/10/2015
 Friday: 30/10/2015
 Saturday: 31/10/2015
Do you want to print the next week(Y/N)? Y

 Sunday: 1/11/2015
 Monday: 2/11/2015
 Tuesday: 3/11/2015
 Wednesday: 4/11/2015
 Thursday: 5/11/2015
 Friday: 6/11/2015
 Saturday: 7/11/2015
Do you want to print the next week(Y/N)? N
Bye!
```

```
clear;
day = input('Introduce the day: ');
month   = input('Introduce the month: ');
year    = input('Introduce the year: ');
dayweek = input('Introduce the day of the week (1 to 7): ');
ccont   = 'Y';
dayinit = dayweek + 1; % print starting from day following 'dayweek'
while (ccont == 'Y')
    for i = dayinit:7
        day = day + 1;
        switch month
            case {9, 4, 6, 11}
                if day > 30
                    day = 1;
                    month = month + 1;
                end
            case {1, 3, 5, 7, 8, 10, 12}
                if day > 31
                    day = 1;
                    month = month + 1;
                end
            otherwise % case 2
                maxfeb = 28;
                if ((rem(year,4) == 0) && (rem(year,100) ~= 0)||
rem(year,400) == 0)
```

```
                    maxfeb = 29; % leap year
                end
                if day > maxfeb
                    day = 1;
                    month = month + 1;
                end
            end
            if month > 12
                year = year +1;
                month = 1;
            end
            dayweek = dayweek + 1;
            if dayweek > 7
                dayweek = 1;
            end
            switch dayweek
                case 1
                    fprintf('\n Sunday: ');
                case 2
                    fprintf('\n Monday: ');
                case 3
                    fprintf('\n Tuesday: ');
                case 4
                    fprintf('\n Wednesday: ');
                case 5
                    fprintf('\n Thursday: ');
                case 6
                    fprintf('\n Friday: ');
                case 7
                    fprintf('\n Saturday: ');
            end
            fprintf('%d/%d/%d', day, month, year);
        end
    % all of the above is to print the current week
        fprintf('\n');
        dayinit = 1; % for all following weeks, you need to print them
    fully, starting from day 1
        ccont = input('Do you want to print the next week(Y/N)? ','s');
        while ((ccont ~='Y') && (ccont ~='N'))
            disp('Wrong answer');
            ccont = input('Do you want to print the next week(Y/N)? ');
        end
    end
```

Exercise 5

Write a program that prints the following figure on screen:

```
    *
   ***
  *****
 *******
*********
 *******
  *****
   ***
    *
```

```
limitStars = -1;
limitWhites = 5;
for line = 1:9
    if line <= 5
        limitWhites = limitWhites - 1;
        limitStars  = limitStars + 2;
    else
        limitWhites = limitWhites + 1;
        limitStars  = limitStars - 2;
    end
    for b = 1:limitWhites
    % print whites
    fprintf(' ');
    end
    for a = 1:limitStars
    % print stars
    fprintf('*');
    end
    % change line
    fprintf('\n');
end
```