COMPUTER PROGRAMMING (MATLAB)
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EXERCISES

1) Mark the following attempts as either valid or not valid assignment statements:

	Valid	Not valid
A=2%	____	____
F$=temp	____	____
A+6=b+3	____	____
A=2	____	____
10=10	____	____

2) Write a MATLAB statement to set the real variable Circumference to the product of variable Diameter and pi .

3) Given the “fprintf” statement below, what would be printed?

```
Result=12;
fprintf('The result is %4d.', Result);
```

4) What is the “fprintf” statement to print the value of an integer variable GPA (right justified in 4 columns), after the words “The GPA is : ”

5) Write a MATLAB program to print the sum of the values 13, 42 and 35, followed by that sum divided by 3. Make sum a variable. Remember to use proper program formatting.

6) Use “fprintf” statement and field width specifiers as needed to produce the following output. The values are to be coded as literal constants with field width specifiers (The first two lines only show column numbers, read vertically);

```
000000000011111111112222222222333333333344444444455555555556666666666
012345678901234567890123456789012345678901234567890123456789012345678
The Matrix is:  15   3  43
                23  45  78
                65   5 102
```

7) Use “fprintf” statement and field width specifiers as needed to produce the following output. The first value is to be obtained from the variable “MinRatio”, the second from the variable “MaxRatio”. (The first two lines only show column numbers, read vertically);

```
000000000011111111112222222222333333333344444444455555555556666666666
012345678901234567890123456789012345678901234567890123456789012345678 9
The ratio between the classes ranged from    4.56
                                             7.92
```

8) Write the MATLAB statement(s) necessary to display a prompting message for an input value to receive the value from the program user. The value is a real acidity ratio received as the variable AcidRatio.

9) What does the following program print?

```
x = 1;
total = 0;
while x <= 10
   y= x*x;
   fprintf(‘%d\n’, y);
   total = total + y;
   x = x + 1;
end
fprintf(‘Total is %d\n’, total);
```

10) Given that A=1(true), B=1(true), C=0(false), D=1(true); what is the value of the following expression?

```
A | ~B & C | D
```

---

11) Which of the following(s) is a syntactically correct MATLAB Boolean expression?

a) A | B ~C
b) A < B < C
c) A < B | B < C
d) true=false
e) none of them

12) Which of the following(s) is/are definitely true if A is the largest of A, B, C (and not equal to the others)? (Circle all that apply)

a) (A > B) & (B > C)
b) (C < A) & (A > B)
c) (A > C) | (A > B)
d) (A > C) | (C > B)

13) Write a Boolean expression that is true when any of the following is false:

Highvalues (assigned “1 (true)” or “0 (false)”)
Ch is ‘*’
X less than Max.

14) Write an if-else statement that prints a message saying whether x is positive, negative, or zero.

15) For a load of 0 to 500 pounds, a tire pressure of 26 to 27 pounds per square inch(PSI) is recommended. For a load of 501 to 1000 pounds, 27 to 29 PSI, for 1001 pounds and above, 29 to 32 PSI is recommended. Write an if statement that prints “correct pressure” or “incorrect pressure” as appropriate for the values of variables Load and Pressure.

16)

```
max = 100;
a = input(‘Enter a: ‘);
b = input(‘Enter b: ‘);
if a>b
  if (a <=max) & (b<=max)
    fprintf(‘%d\n’, a+b);
  else
    fprintf(‘%d is larger than %d AND Maximum\n’, a, b);
  end
else
  fprintf(‘%d\n’, a+b);
end
```

Which of the followings most correctly completes the following description of the above program segment?

This program read two numbers and prints their sum _____

a) usually.
b) If both are less than 100.
c) If the second is less than or equal to the maximum and smaller than the first.
d) If the first is less than or equal to 100 or not larger than the second.

17) Under which of the following conditions will the if statement print “Done”?

```
if (m<3) | (~code)
   if (m==n) | code
     fprintf(‘done’);
   else
     if m<n
        % do nothing
     else
        fprintf(‘done’);
     end
   end
end
```

Case	m	n	code
I	2	5	1(true)
II	2	3	0(false)
III	5	7	0(false)
IV	7	7	0(false)
V	7	7	1(true)

a) I only.
b) II only.
c) III only.
d) IV only.
e) V only.
f) I and II only.
g) I, III, IV and V only.
h) I and IV only.
i) I, IV and V only.

18) Write an if statement that prints “Amusing” if the sum of “Cats” and “Dogs” is less than or equal to 2, and prints “Too exciting” and underlines it (i.e. “-----------“) otherwise.

19) Match the terms with the definitions that follow.

----- Sentinel-controlled loop.
----- Priming read.
----- Counting loop.
----- Iteration.
----- Loop exit.
----- Termination condition.
----- Count-controlled loop.
----- Event-controlled loop.

a) An individual pass through, or repetition of, body of the loop.
b) The point in the execution of the loop when repetition ends and control passes to the statement after the loop.
c) The statement after the loop.
d) A loop that executes a known number of times.
e) A loop that terminates on the occurrence of a particular result.
f) An event-controlled loop that reads a special value as its event.
g) An event-controlled loop that uses a Boolean variable to record its event.
h) A read statement that occurs before the loop body that processes its input data.
i) A loop which counts something other than its own iterations.
j) The loop control variable that is used to count repetitions of the loop.
k) A variable incremented on the occurrence of a particular result.
l) Those conditions that must exist at the beginning of each iteration.

20) Write a count controlled loop that executes for each of the integer values 1 to MaxCount. The body of the loop will read an integer and will echo it back to the screen.

21) Write an event-controlled loop that stops when a ‘Z’ has been read and the previous value read was an ‘A’. Read only characters.

22) Write an event-controlled loop that reads characters and stops when 15 ‘A’s have been read.

23) Write a loop that counts the number of blanks in the current line of file input (i.e. keyboard).

24) Write a while loop that counts how many of the integer values entered from keyboard are less than their previous value (there are at least two values to be read and -1 terminates the loop).

25) Write a while loop that uses the Boolean variable SmallSum to control the loop. SmallSum will become False, stopping the loop, when the sum of the integers read so far is greater than 1000. Reading a negative value will also set SmallSum to false. A negative value should not be added into the sum.

26) Write a while loop and a for loop to add the numbers from 1 to 10 and store the sum in the variable Sum.

27) Mark the following as true or false:

----- When matching the parameters of a function call, the relative order of the actual and formal parameters is all that is significant, not the matching of names or types of the parameters.

----- Not every function need have a parameter list.

----- The formal and actual parameters have to be variables.

28) Write main program block sufficient to call the function with the header below. The program block will have two calls to this function with different parameter names.

function WaterTable(BelowLevel, DaysToUpLevel, RainPerDay)

Note: BelowLevel and DaysToUpLevel are integers and RainPerDay is floating point

29) Write a function to perform the following task with the specified input.

Also write a call to the function using parameters (if any) with the same names.

Take two numbers and return the smaller of the two.

30) Write a function which has three parameters (integer). Function will do the following:
It will print a rectangle of stars. (Number of rows is specified by the first parameter, and number of columns by the second parameter. Function will return the result of multiplication of the first two parameters).

For example: If first actual parameter is 3 and the second one is 4 then the function will print the followings:

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

(Write also a call to the function).

31) Write a function that returns the sum of the three integers that are read from the keyboard in the function (they are not parameters, but local variables).

32) Which of the following is a recursive call in the body of the function X?

```
a. X = 12 – 37 * Small;
b. X() = X1 – 42;
c. X2 = c;
d. A= X – 1;
```

33. Rewrite the following “for” loop as “while” loop.

```
for i=1:10
   fprintf('%-5d', i);
end
```

34. Write a for loop to replace the following while loop.

```
sum=3;
k=3;
n=6;
while k<=n
   sum = sum + k – (k - 2);
   k = k + 1;
end
```

35. Write a “switch” statement to perform the tasks as specified for the character values of the selector variable “Punctuation”. Each function returns nothing and has no parameter).

Punctuation	Call the function
;	VerbSearch
,	ConjSearch
.	SentenceTest
“	ConjSearch

36. Write a MATLAB statement to print the character represented by the ASCII value 63.

37. Mark the following as true or false:

------- Like a file, the components of an array/vector must be accessed one at a time, from the beginning to the end.

------- An “fscanf” statement is used to access a component of an array.

------- Array variables may not be passed as parameters.

38. Assign the value 11 to the tenth component of the array ‘Ranges’

39. Use an output statement to print the fourth component of the integer array “MyArray” below on a line by itself.

40. Fill the array/vector ‘Reals’ with the values 0. It has 26 elements.

41. Write a function that accepts an array of integers and prints every component value greater than 100. Write also an example call to the function as well.

42. Write a program to sort an array’s values into ascending order. What modifications should you do in the program so that it sorts the array’s values into descending order.

43. Write the MATLAB code necessary to print the component value in the third column of the first row of the array ‘real12’ which has 3 rows and 4 columns.

44. Write the MATLAB code necessary to print the sum of each row of the two dimensional array / matrix ‘Digits’ which has 3 rows and columns.

45. Initialize 2 three-dimensional arrays that can contain 1000 values to zero. However some of their dimensions should contain different number of maximum values.

46 Write a complete program to create a text file which will contain the integers (entered in “input” in a loop until a –1 is entered). Then you are supposed to read the values from the text file into a single dimensional array. After that take the square root of all elements in the array. After that write these values back to the same text file which will now contain the squareroots (previous file will of course will be re-created). And then finally open the file for reading and read all the values (squareroots) from the file and print them on the screen.

47. Write a “recursive” function as follows. Its name is “recur”. It has one integer parameter and depending on this parameter it produces an output. For example:

If you call it as:

```
recur(4);
```

It prints:

```
4 3 2 1 0 2 4 6 8
```

However if you call it as:

```
recur(3);
```

It prints:

```
3 2 1 0 2 4 6
```

Or, if you call it as:

```
recur(7);
```

It prints:

```
7 6 5 4 3 2 1 0 2 4 6 8 10 12 14
```

48. Mark the following as true or false :
_____ The fields of a structure must be of the same type.
_____ The field identifier is used to name a part of a structure.
_____ A field selector in a statement consists of the name of a structure, a period (dot), and a field identifier.

49. Which of the following is not a correct use of a field selector given the declarations below? (There may be zero or more).
PhonoRecord is a structure containing

```
     string title;            | a. Character = PhonoRecord.title;
     string artist;           | b. PhonoRecord.year = 1999;
     integer year;            | c. fprintf('%c', PhonoRecord.artist(1));
     integer RPM;             | d. fprintf('%d', PhonoRecord(1).RPM);
```

50. Write a function to search a variable of the list type for an input width. The parameter will be the array/vector. The function will return 1 if inputted width is found in the list. Otherwise it will return 0. The type of list type is a vector of structures containing the following fields

```
     integer length;
     integer width;
     floating point thickness;
     character kind;
```

51. Write a MATLAB fragment to print all structures in a list (of structures) that have names that start with 'C'.

list contains 6 structures and each structure contains

```
     string name;
     floating point sales;
     integer employees;
```

52. Given the structure organization below, write a MATLAB program fragment to print the title and year fields of the structure if the topic is ‘Heartbreak’.

PhoneRecord is a structure containing the following fields:

- string title;
- string artist;
- integer RPM
- and a substructure containing the following fields:
  - integer year;
  - integer style;
  - string topic;

53. Write “linear search” function to search an array for a value

54. What is the output of the following program?

```
function [y] = X(a)
   fprintf(‘%d ‘, a);
   y = 1;
   if a > 0
       y = y + X(a-1); % recursion
   end
   fprintf(‘%d ‘, y);

----------

In the workspace:
>>  fprintf(‘%d ‘, X(2));
```

55. Write a function that returns the sum of the squares of the elements in “each” row in a two-dimensional array coming as a parameter. Also write a call to the function in main workspace. And “after” the function returns, the first “column” (column 0) of the returned array should contain the sum of the squares of the rows.

56. Consider the structure type defined in question 52. Now, in this question, write a program that contains an “array of such structures” (each element of the array is the structure defined). One function is used to input values from keyboard into this array (returning from the function), another function “searches” this array (search is based on the “topic” in the inner structures. When the function finds the appropriate structure in the array, it prints the information of that specific structure element. The third function prints all the array (all structures) (each structure in a separate line).

57. A palindrome is a pattern of letters which can be read from the beginning to end or from the end back to the beginning in the same way. For example, “HelloolleH” and “Hello World dlroW olleH” are palindromes, but “Hello World Hello” is not. Write a “recursive” function which tests a string coming as a parameter is a palindrome or not. If palindrome return 1 otherwise return 0.

58. Write a function ***findlong*** that will return the longest word of a sentence where the words are separated with a single blank, and the sentence ends with the newline character ‘\n’ from the keyboard (sentence is a parameter to the function).