Cairo University	**Cairo University** **Institute Of Statistical Studies And Researches**	
	Department: Computer Sciences	
	Academic Year: 2015-2016 **Semester:** Second	
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Course Title:	**Course code:**	**Time:**	**Exam marks:**	**# Exam. Sheets:**
MATLAB Programming	CS522	3 Hours	80	2 (4 Pages)

Exam. Instructions : ANSWER THE ALL FOUR QUESTIONS

Question One: (20 Marks)

What are the outputs of the following expressions:

1. 4 + 5 * 3
2. 2 * 10 ^ 4
3. -5 ^ 2
4. 10 – 6 / 2
5. 5 * 4 / 2 * 3
6. 4 - -4 + 4 ^ 2 * 4 / 2
7. 'c' ~= 'd' - 1 || 2 > 4
8. 10 == 5 + 5
9. ceil(10 + 25 / 3)
10. round(10 + 25 / 3) == floor(10 + 25 / 3)
11. Inf / Inf
12. ~ ~ (34/17) == (34/17)
13. zeros(3)
14. 1:5'
15. eye(2)
16. nnz(ones(3,5))
17. y = 2 : 2 : 8 ; y .\ 48

18. a = [2 1 ; -1 4] ; b = [-1 3 ; 0 2] ; a * b

19. v = [0 9 0] ; w = [2 , 1 , 5] ; v .* w

20. d = [1 2 3 ; 4 5 6] , d .^ 2

Question Two: (30 Marks)

Execute the following instructions in order on the following matrix M and write their outputs:

M =
8 1 6
3 5 7
4 9 2

1. min(M)
2. max(M)
3. min(M,[],1)
4. size(M)
5. mean(M,2)
6. prod(M)
7. M'
8. M .^ 2
9. 2 .\ M
10. fliplr(M)
11. flipud(M)
12. diag(M)
13. M >= 5
14. M(3,:)
15. M(:,2)
16. M(2:3,2:3)
17. M(3,1)
18. M([1 3 5 7])

19. M(end)

20. sum(M)

21. sum(M,2)

22. sum(diag(M))

23. What is the type of matrix M? Create it in MATLAB using a built-in function?

24. M(2,4) = 9

25. length(M)

26. find(M == 9)

27. nnz(M)

28. M(:,end) = [ ]

29. M([1 end],:)

30. sum(sum(~M))

Question Three: (12 Marks)

Write one instruction line for executing each of the following:

1. Create a 3*2 matrix M of uniformly distributed random numbers in an open interval (0,10).
2. Create a cell array C of size 2*3.
3. Create a structure S that contains a student name and score.
4. Get the rows and columns indices of the elements that are between 6 and 12 in a matrix M.
5. Get the inverse of a square matrix M.
6. Export a numeric matrix M to the third sheet in an excel file named “myexcel.xlsx”.
7. Export a numeric matrix M to a comma-separated file named “mytext.txt”.
8. Import numeric values from a space-delimited ASCII file named “mydata.dat” into a matrix M.
9. Delete all the variables created in the current session.
10. Create a 3D array N containing two 2D matrices A and B.
11. Display the content of the cell at row 3 and column 2 in a cell array C.
12. Get the number of Inf values that could be found in a matrix M.

Question Four: (18 Marks)

Solve the following problems:

1. Trace the output of the following code:

```
number = 20;
while number > 0
    if(mod(number,3))
        number = number - 1;
        continue;
    end
    disp(number)
    number = number - 1;
end
```

2. Rewrite the following code using **nested if-else:**

```
letter = lower(letter);
switch letter
    case 'h'
        disp('hello')
    case 'y'
        disp('yes')
    case 'n'
        disp('no');
    case 'x'
        disp('quit')
    otherwise
        disp('error')
end
```

3. Write a function called **circleArea** takes a circle radius value as an input argument and returns the circle area as an output. The circle area formula is:

$$\text{Area} = \pi * \text{Radius}^2$$

The call to this function from the command window is as follows:

```
>> A = circleArea(10)
A =
  314.1593
```

4. Write a function called **isPerfect** takes a number as an input argument and displays the word "Perfect" if it's a perfect number or "Not Perfect" otherwise. A number is perfect when the sum of its factors excluding the number itself is equal to the number, e.g., 6 is a perfect number because the sum of its factors (1+2+3 = 6) is equal to 6 while 8 is not perfect (1 + 2 + 4 = 7). The call to this function from the command window is as follows:

```
>> isPerfect(28)
ans =
 Perfect
>> isPerfect(24)
ans =
 Not Perfect
```