

Programming tools for mathematics

L1: Math

MAY, 17th 2025 Duration: 1h 30min

Final exam for the normal session

First Name:

Last Name:

Group:

Exercise 01: (06pts)

1. Respond with **True** or **False**

"disp" is used to clear the workspace	false	0,5
"enter" is a valid command	false	0,5
"pi" is a variable	true	0,5
"Inf" is used to read values from the keyboard	false	0,5

2. Write the following expressions in MATLAB:

$a = \frac{6 + \sqrt{9 + 4}}{2 + e}$	$a = (6 + \text{sqrt}(9+4)) / (2 + \text{exp}(1))$	0,5
$b = \log_{10} 5a + \ln 2^{5a+2}$	$b = \log_{10}(5*a) + \log(2^{(5*a+2)})$	0,5
$c = \sqrt{a^2 + b^2} \times 5a + 6b $	$c = \text{sqrt}(a^2 + b^2) * \text{abs}(5*a + 6*b)$	0,5
$d = e^{5c+a} + \cos \pi + 4x$	$x = \text{sym}('x'); d = \text{exp}(5*c + a) + \cos(\text{pi}) + 4*x$	0,5

3. Calculate the values of the following variables (if possible):

$w = \text{round}(6.7)$	$w = 7$	0,5
$x = \text{length}(2.6)$	$x = 1$	0,5
$y = \text{floor}(7.65) + \text{ceil}(-8.4)$	$y = 7 - 8 = -1$	0,5
$z = \text{mod}(24,2) + \text{fix}(24.2)$	$z = 24$	0,5

Exercise 02: (06pts)

Given the matrix $M = \begin{pmatrix} 2 & 4 & 6 & 8 \\ 10 & 12 & 14 & 16 \\ 18 & 20 & 22 & 24 \\ 26 & 28 & 30 & 32 \end{pmatrix}$, perform the following tasks:

1. Propose two ways to create the matrix M in MATLAB

a. $M = [2, 4, 6, 8; 10, 12, 14, 16; 18, 20, 22, 24; 26, 28, 30, 32]$ (1)

b. $M = \text{reshape}(1:32, 4, 4)$ (1)

2. What is the result of each command (put error if not possible)

$M(5)$	4	$M([2:\text{end}], [\text{end } 3])$	$\begin{matrix} 14 & 16 \\ 22 & 24 \\ 30 & 32 \end{matrix}$	0,25
$M(8)$	28			
$M(3, 3)$	22			
$M(:, 2)'$	4 12 20 28	$M(3, :)'$	$\begin{matrix} 18 \\ 20 \\ 22 \\ 24 \end{matrix}$	0,25
$M(0, 2)$	Error			

3. Write the commands for these tasks:

a) Insert the row vector V as a new row in M

$M = [M; V]$ (0,5)

b) Replace the last column of M with a row vector W

$M(:, end) = W'$ (0,5)

c) Replace all the odd numbers in M with 20.

$M(mod(M, 2) \neq 0) = 20$ (0,5)

d) Change the size of matrix M to 2 x 10

$M = reshape(M, 2, 10)$ (0,5)

Exercise 03: (04pts)

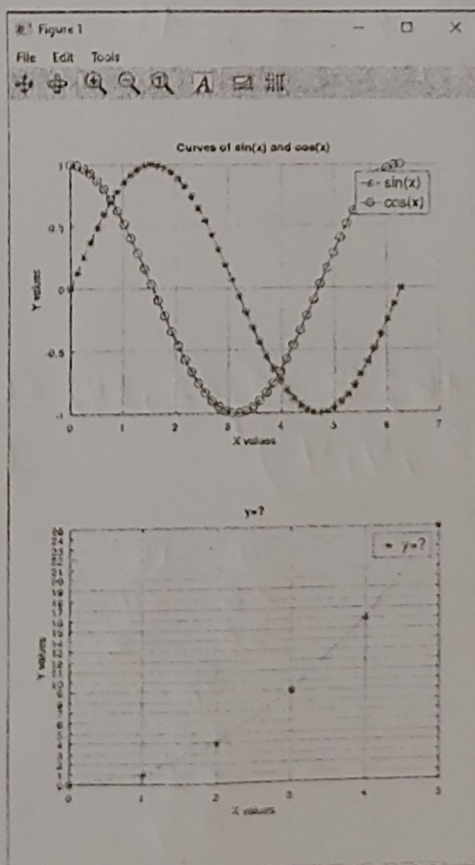
Write a MATLAB function "calculateSeries(x,n)" for the following expression:

$$S = x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots + \frac{x^n}{n}$$

```
function S = calculateSeries(x,n)
    S = 0;
    for i = 1:n
        Term = x^i / i;
        S = S + Term;
    end
end
```

4pts

Exercise 04: (04pts): write the Matlab script for this figure:



```
x = linspace(0, 2*pi, 50);
subplot(2,1,1)
hold on;
plot(x, sin(x), 'k--*')
plot(x, cos(x), 'k-o')
xlabel('X values'); ylabel('Y values');
hold off;
title('Curves of sin(x) and cos(x)')
legend('sin(x)', 'cos(x)')
grid on;
subplot(2,1,2)
x = 0:5; y = x./2;
plot(x, y, 'k:*')
xlabel('X values'); ylabel('Y values')
title('y=?')
legend('y=?'); grid on;
```

4pts