CAD Practical Midterm Exam 20%

Spring 2022 **Time: 40 minutes**

الاسم: ..... رقم القيد: ..... المجموعة: .....

Q: (8 Marks) Solve the following Mathematical expressions using MATLAB:

Mathematical Expression	MATLAB Code

$\frac{d}{dt}\ \ln(2t)\sin(2t)$	`syms t`
	`diff(log(2*t) * sin(2*t))`
	`ans =`
	`sin(2*t)/t + 2*cos(2*t)*log(2*t)`

$\int_0^{\pi} 4t^3\ \cos(t^4)\ dt$	`syms t`
	`int(4*t^3*cos(t^4), 0, pi)`
	`ans =`
	`sin(pi^4)`

$\int e^{-t}\ t^3\ dt$	`syms t`
	`int(exp(-t)*t^3)`
	`ans =`
	`-exp(-t)*(t^3 + 3*t^2 + 6*t + 6)`

$k = \sum_{n=1}^{100} \frac{2n+1}{n!}$	`n = 1:100; k = sum((2*n + 1)./factorial(n))`
	`k =`
	`7.1548`

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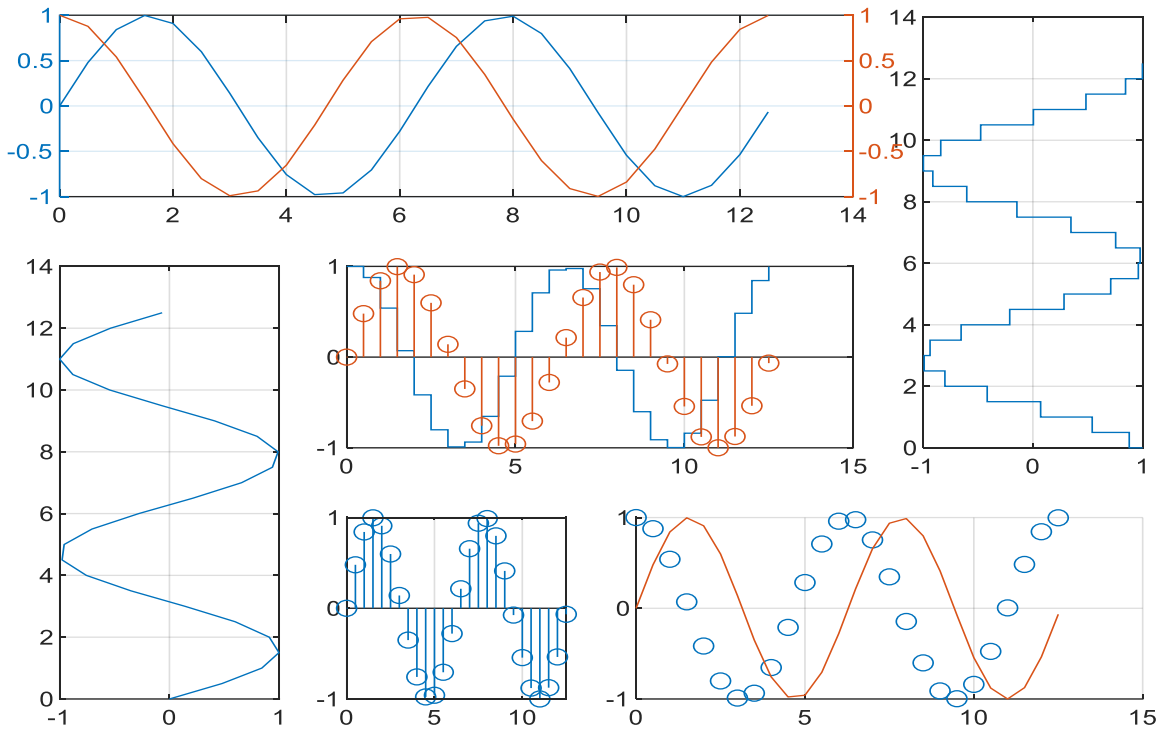
Q: (6 Marks) Write a MATLAB code to get the following Figure:



```
clear; close all; clc; t = 0:0.5:4*pi;

subplot(3,4,[5 9]) ;  plot(sin(t),t), grid on
subplot(3,4,10)    ;  stem(t,sin(t)), grid on
subplot(3,4,11:12) ;  scatter(t,cos(t)), hold on, plot(t,sin(t)), grid on
subplot(3,4,6:7)   ;  stairs(t,cos(t)), hold on, stem(t,sin(t)), grid on
subplot(3,4,[4 8]) ;  stairs(cos(t),t), grid on
subplot(3,4,1:3)   ;  plotyy(t,sin(t),t,cos(t)), grid on
```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Q: (6 Marks) Solve the following Algebraic Equations using MATLAB, ***your answer must be in decimal form***:

$$2x - 2z + 36 = 3 + 4y - 7z$$
$$2x - y + z + 2 = z - 2x - 3$$
$$x + 2y - 6z - 7 = 3x + 12 - 3z$$

$$2x - 4y + 5z = -33$$
$$4x - y + 0z = -5$$
$$-2x + 2y - 3z = 19$$

```
>> A = [2 -4 5; 4 -1 0; -2 2 -3]; b = [-33 ; -5 ; 19];
>> linsolve(A,b)
ans =
   -0.5000
    3.0000
   -4.0000
```

$$\frac{1}{x-3} + \frac{1}{x+3} = \frac{-10}{x^2-9} \quad \rightarrow \quad \frac{1}{x-3} + \frac{1}{x+3} + \frac{10}{x^2-9} = 0$$

```
syms x; double(solve( 1/(x-3) + 1/(x+3) + 10/(x^2-9) ))
ans =
    -5
```

Best of luck

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