

SUMS MATLAB Applications

1 play • 9 players

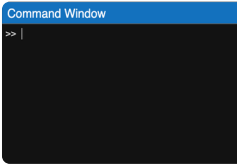
 A public kahoot



Questions (20)

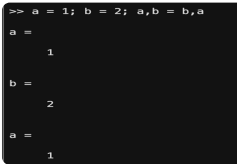


1 - Slide
MATLAB Basics



2 - Quiz
Which of the following clears the MATLAB command line?

-  ☐ clc ✓
-  ☐ clear ✗
-  ☐ wipe ✗
-  ☐ clean ✗



3 - Quiz
Let a=1; b=2. Run a,b = b,a = b,a = a,b. What are the values of a,b?

-  ☐ a = 1, b = 1 ✗
-  ☐ a = 1, b = 2 ✗
-  ☐ a = 2, b = 1 ✗
-  ☐ a = 2, b = 2 ✓

4 - Quiz

Which of the following is NOT a valid line of MATLAB code?



T = A'



v = [1 2 3]



y = x^2x



i = 1:10:100:1000



```
help('transpose')
% Transpose.
% 'X.' is the non-conjugate transpose.

B = transpose(A) is called for the syntax 'A,' when A is an object.
See MATLAB Operators and Special Characters for more details.
See also ctranspose, hcat, hcatc, hcatcsc.
Documentation for transpose
Other uses of transpose
```

5 - Quiz

Which of the following is NOT a valid MATLAB import?



import java.lang.String; % Java import



loadlibrary('utils', 'utils.h'); %C import



np = py.importlib.import_module('numpy'); % Python import



using CUDA.jl; % Julia import



```
>> py.dict(A=1,B=2)

ans =

Python dict with no properties.

{'A': 1.0, 'B': 2.0}
```

6 - Quiz

What option allows you to plot multiple functions on one graph in MATLAB?



new_plot off;



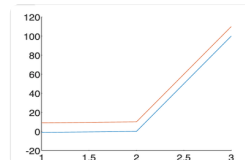
plot(x, stack=on);



plot(x, new=off);

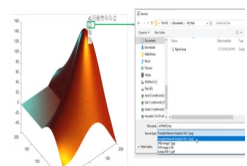


hold on;



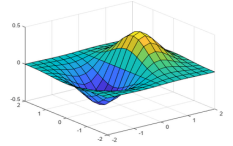
7 - Slide

Data Visualization



8 - Quiz

What MATLAB function can be used to create a 2D/3D coordinate grid?



coordgrid



meshgrid



axisequal

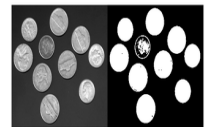


gridxyz



9 - Quiz

How would you create a binary image from a colored photo? We have already run `img = imread('IMG.jpg');`



`gray = rgb2gray(img); bin = imbinarize(gray);`



`color = gray2rgb(img); bin = imbinarize(color);`



`bin = imbinarize(img);`

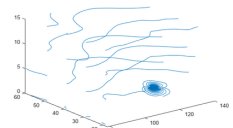


`bin = gray2rgb(img);`



10 - Quiz

What does the `streamline` function do in MATLAB?



Reduces noise in a data set



Creates a cubic spline data interpolation



Plots the streamlines of vector data

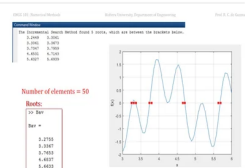


Creates streamline curve or surface to data



11 - Slide

Numerical Analysis



12 - Quiz

What does "fzero" do in MATLAB?

```
>> y = @(x) x^2 - 1;
>> fzero(y,[0 2])

ans =

    1

>> |
```



Find zeros of **ONLY POLYNOMIALS**.



Find zeros of **ONLY SINGLE VARIABLE** functions.



Find zeros of **LINEAR AND NONLINEAR** functions.

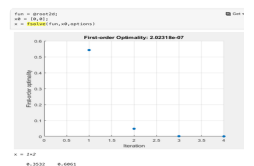


Find zeros of **ANY** function.



13 - Quiz

What does "fsolve" do in MATLAB?



Finds **PRECISE** solutions to **ANY** system of equations.



Finds **APPROXIMATE** solutions to **ANY** system of equations.



Finds **APPROXIMATE** solutions to **LINEAR** system of equations.



Finds **PRECISE** solutions to **LINEAR** system of equations.



14 - Quiz

What does "polyint" do in MATLAB?

```
>> p = [3 0 -4 10 -25];
>> q = polyint(p)

q =

    0.0000    0   -1.3333    5.0000  -25.0000    0

>>
```



Integrates **POLYNOMIALS**.



Differentiates **POLYNOMIALS**.



Integrates **ANY FUNCTION**.



Integrates **ANY LEBESGUE INTEGRABLE FUNCTION**.



15 - Slide

Differential Equations

$$\frac{d^2 y}{dt^2} - \mu(1 - y^2) \frac{dy}{dt} + y = 0.$$

16 - Quiz

What does the **ode45** mean in **ode45** command for solving ordinary differential equations in **MATLAB**?



Solves odes to the 45th order



Stands for the runge-kutta(4,5) method



Stands for the bernoulli(4^5) method



Uses the 45 degree method



In numerical analysis, the **Runge-Kutta methods** (English: https://en.wikipedia.org/wiki/Runge-Kutta_methods) are a family of **implicit and explicit** iterative methods, which include the **Euler method**, used in **temporal discretization** for the approximate solutions of **simultaneous nonlinear equations**.^[1] These methods were developed around 1900 by the German mathematicians **Carl Runge** and **Wilhelm Kutta**.

17 - Quiz

What function can be used to solve **boundary value problems** for ordinary differential equations?



bvp4c



ode45



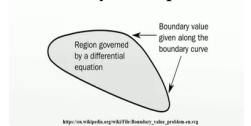
bvp5c



ode15i



Boundary value problem



18 - Quiz

What is the correct input for the **ode45** function in **MATLAB**?



[t,y] = ode45(tspan, y0, odefun, options)



[t,y] = ode45(odefun, tspan, t0, x0, y0, options)



[t,y] = ode45(tspan, t0, odefun, options)



[t,y] = ode45(odefun, tspan, y0, options)



Description

$[t,y] = \text{ode45}(\text{odefun}, \text{tspan}, y0)$, where $\text{tspan} = [t0 \text{ } tf]$, integrates the system of differential equations $y' = f(t,y)$ from $t0$ to tf with initial conditions $y0$. Each row in the solution array y corresponds to a value returned in column vector t .

19 - Slide

Conclusions



20 - Quiz

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Yes



Doing it right now



I will



Will do



Resource credits ^

Purpose

SUMS, a UC San Diego student organization, provides resources, workshops, talks, and social events for UCSD's mathematics community with the goal of promoting mathematics and related fields.