ELEMENTARY MATLAB® COURSE – SESSION 1

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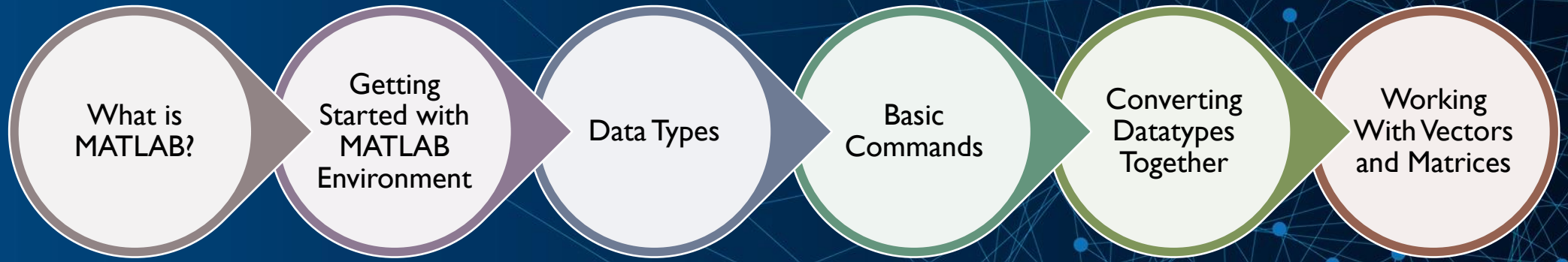

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WHAT IS MATLAB® ?

- MATLAB is a matrix-based tool for numerical computations. It's very powerful and easy to use.
- Both programming language and interactive environment!

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ADVANTAGES AND DISADVANTAGES OF MATLAB®

Advantages

- User-Friendly
- Rich Functionality
- Powerful Visualization
- Community and Resources

Disadvantages

- Cost (Excludes Toolboxes)
- Resource Intensive
- Lack of Speed
- Not Ideal for Large-Scale Projects

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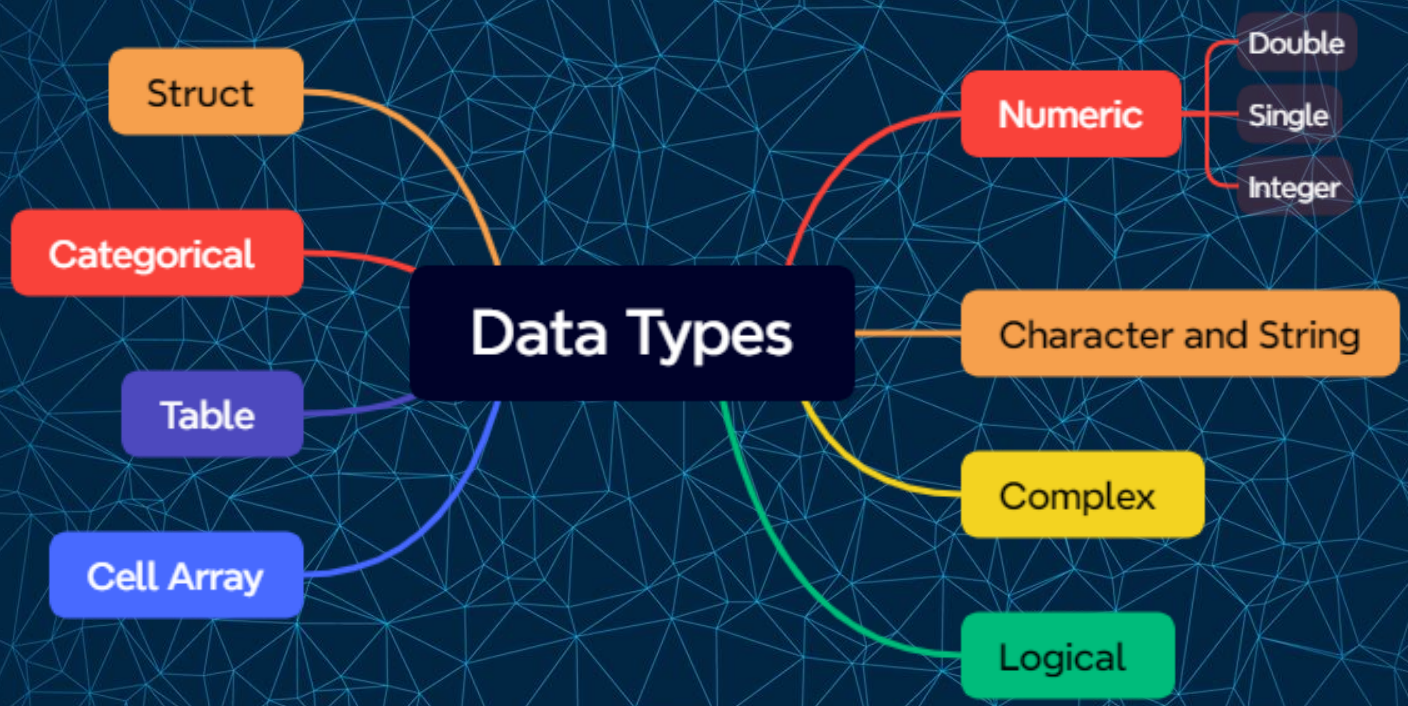
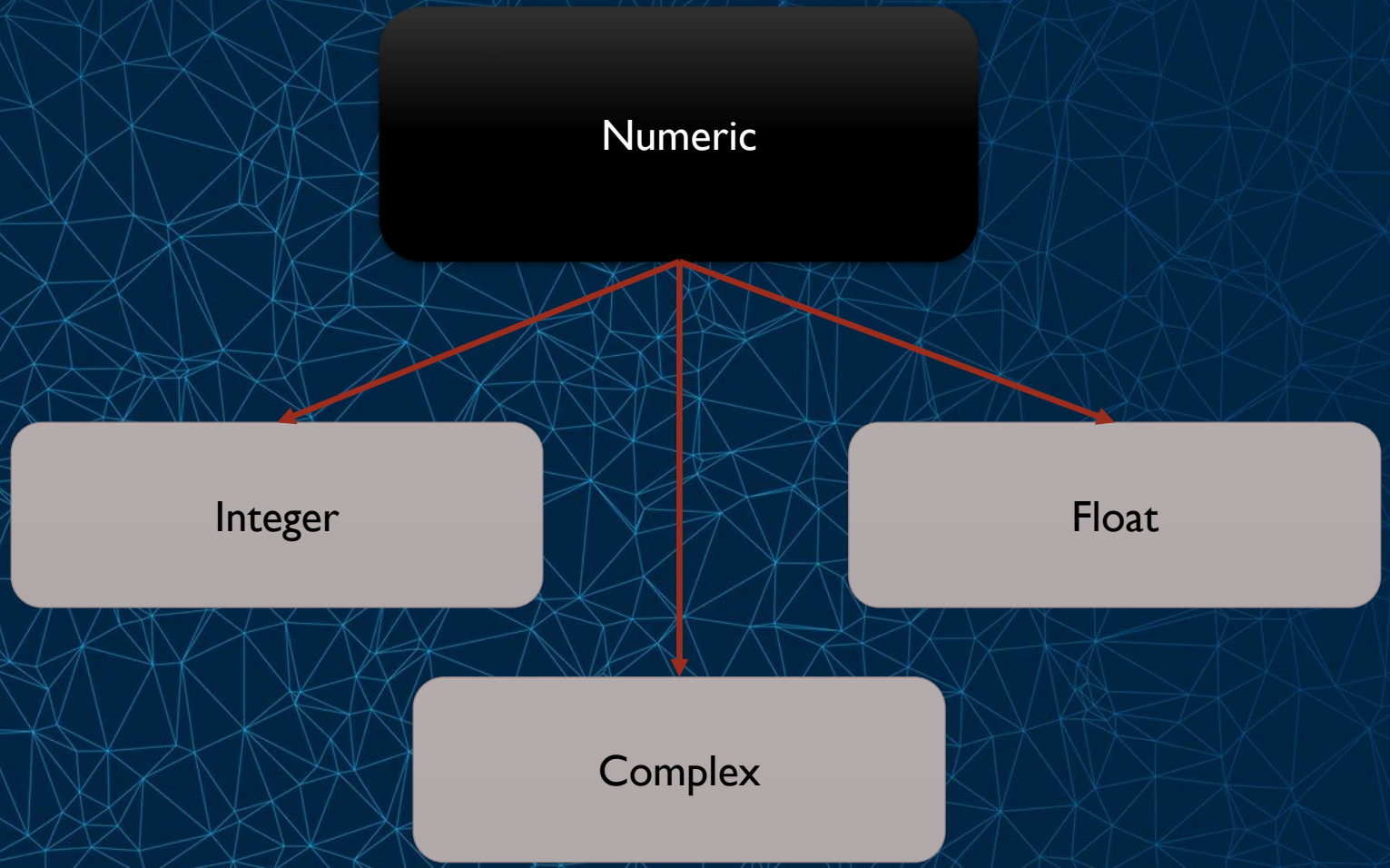

Data Types
Numeric
Double
Single
Integer
Character and String
Complex
Logical
Struct
Categorical
Table
Cell Array

Numeric types from memory POV	
double	Double-precision arrays
single	Single-precision arrays
int8	8-bit signed integer arrays
int16	16-bit signed integer arrays
int32	32-bit signed integer arrays
int64	64-bit signed integer arrays
uint8	8-bit unsigned integer arrays
uint16	16-bit unsigned integer arrays
uint32	32-bit unsigned integer arrays
uint64	64-bit unsigned integer arrays



BASIC COMMANDS FOR WORKSPACE

who, whos	current workspace vars.
clear all	clear workspace vars.
close all	close all figures
clc	clear screen
clf	clear figure
class(x)	show the data type of 'x'
input(x)	**Input 'x' from user**
%	used to denote a comment
%%	used to divide your code into several sections
;	suppresses display of value (when placed at end of a statement)
...	continues the statement on next line

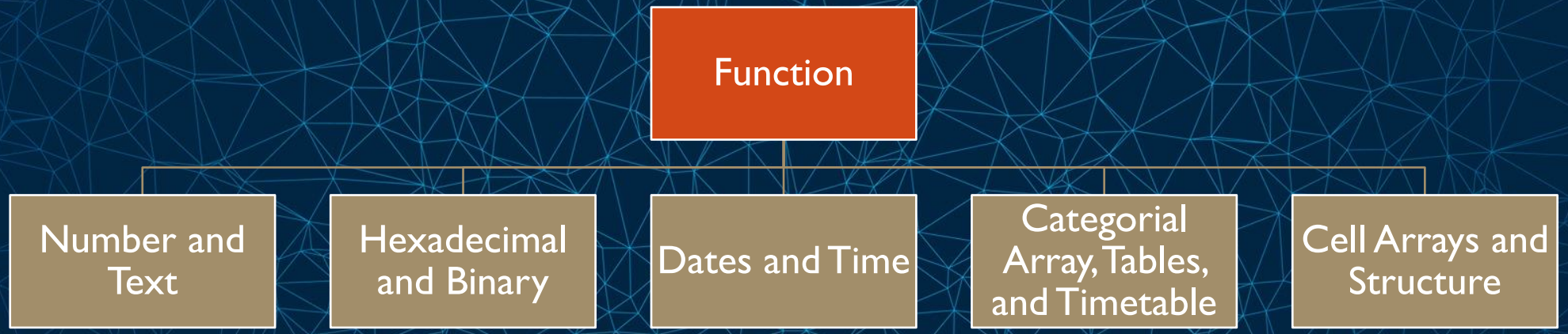
BASIC OPERATION COMMANDS

- **eps** machine epsilon
- **inf** machine infinity
- **realmin** Smallest positive floating-point number
- **realmax** Largest positive floating-point number
- **naN** not-a number, e.g., 0/0.
- Mathematical functions: **sqrt(x)**, **exp(x)**, **cos(x)**, **sin(x)**, **log(x)**, **log10(x)**, **log2(x)**, **asin(x)**,**acos(x)**, **sec(x)**, **sinh(x)**, **cosh(x)**, etc.
- Mathematical Operations: **+ - * / ^ '**
- Constants: **pi**, **exp(1)**,

NOTE FOR NAMING M-FILES

- ✓ M-file names must start with an alphabetic character, may contain any alphanumeric characters or underscores, and must be no longer than the maximum allowed M-file name length(63 character).
- ✓ Never use blank space in the file name.
- ✓ Use (_) instead of space or (-)

CONVERTING DATA TYPES TOGETHER

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VECTORS & MATRICES

VECTORS & MATRICES

- **v = [-4 8 0 2.5 -1.5];** % length 5 row vector.
- **v = v';** % transposes v.
- **v(1);** % first element of v.
- **v= 4:-1:2;** % same as v=[4 3 2];
- **a=1:3; b=2:3; c=[a b];** → c = [1 2 3 2 3];

- **x = linspace(-pi,pi,10);** % creates 10 linearly-spaced elements from –pi to pi.
- **logspace** is similar.
- **A = [1 2 3; 4 5 6];** % creates 2x3 matrix
- **A(1,2)** % the element in row 1, column 2.
- **A(:,2)** % the second column.
- **A(2,:)** % the second row.

- **A+B, A-B, 2*A,** % matrix addition, matrix subtraction, scalar multiplication
- **A.*B** % element-by-element multiple
- **A./B** % element-by-element div.
- **A’** % transpose of A (complex-conjugate transpose)
- **dot(A,B)** % dot product of A & B
- **A*B** % cross product of A & B
- **det(A)** % determinant of A
- **inv(A)** % inverse matrix of A

- **diag(v)** % change a vector v to a diagonal matrix.
- **diag(A)** % get diagonal of A.
- **eye(n)** % identity matrix of size n.
- **zeros(m,n)** % m-by-n zero matrix.
- **ones(m,n)** % m*n matrix with all ones.
- **Randi([a, b], m,n)** % Create a m*n matrix with random variables from a to b

MORE MATRICES/VECTOR OPERATION

- **length(v)** % determine length of vector.
- **size(A)** % determine size of matrix.
- **find(A)** % determine indices of non-zero elements
- **sum(A)** % determine sum of elements
- **max(A)** % determine maximum element
- **min(A)** % determine minimum element
- **mean(A)** % determine mean of elements
- **sort(A)** % sort element from minimum to maximum value

END OF SESSION 1

Thanks for your attention. 🥹