



NAVI MUMBAI

MATLAB

Unit 2-Lecture 2

BTech (CSBS) -Semester VII

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Predefined variables

variable	description
ans	Value of last expression
eps	Smallest difference between 2 numbers
i	$\sqrt{-1}$
inf	Infinity
j	Same as i
NaN	Not a number
pi	The number π



Some Useful MATLAB commands

- `who` List known variables
- `whos` List known variables plus their size
- `help` `>> help sqrt` (Help on using `sqrt`)
- `clear` Clear all variables from work space
- `clear x y` Clear variables `x` and `y` from work space
- `clc` Clear the command window



Variable and assignment statement

variable name = expression

Command window:

```
>> mynum = 6  
mynum =  
      6  
>>
```

Correction: The variable name must always be written on left, and expression on right.

Now write in Command window:

```
>> 6 = mynum  
    6 = mynum  
    |
```

Error: The expression to the left of the equals sign is not a valid target for an assignment.

```
>>
```



Initializing, incrementing & decrementing

Frequently, values of variables change, as shown previously. Putting the first or initial value in a variable is called *initializing* the variable.

Adding to a variable is called *incrementing*. For example, the statement

```
mynum = mynum + 1
```

increments the variable *mynum* by 1.

Similarly, *mynum*=*mynum*-1, will be *decrementing* variable.



Floating-Point Numbers

For floating point number there are two basic types:

- Double-Precision Floating Point
- Single-Precision Floating Point

The integer type are **int8, int16, int32, int64**.

These integers represent the **bits** used to store the value of data type.

type **char** is used to store the **character or string** eg. 'cat'

type **logical** is used to store true/false.



Numerical Expression

Expressions can be created using values, variables that have already been created, operators, built-in functions, and parentheses. For numbers, these can include operators such as multiplication and functions such as trigonometric functions. An example of such an expression is:

```
>> 2 * sin(1.4)
ans =
    1.9709
```



Format Command

This will remain in effect until the format is changed back to **short**, as demonstrated in the following.

```
>> format long  
>> 2 * sin(1.4)  
ans =  
    1.970899459976920
```

```
>> format short  
>> 2 * sin(1.4)  
ans =  
    1.9709
```




Format Command

The **format** command can also be used to control the spacing between the MATLAB command or expression and the result; it can be either **loose** (the default) or **compact**.

```
>> format loose
```

```
>> 5*33
```

```
ans =
```

```
165
```

```
>> format compact
```

```
>> 5*33
```

```
ans =
```

```
165
```

```
>>
```



Nested Parentheses

Within a given precedence level, the expressions are evaluated from left to right (this is called *associativity*).

For the operators that have been covered thus far, the following is the precedence (from the highest to the lowest):

()	parentheses
^	exponentiation
-	negation
*, /, \	all multiplication and division
+, -	addition and subtraction



Operator precedence rule:

Operators	Precedence
Parentheses: ()	Highest
Power ^	
Unary: Negation (-), not (~)	
Multiplication, division *, /, \	
Addition, subtraction +, -	
Relational <, <=, >, >=, ==, ~=	
And &&	
Or	
Assignment =	Lowest



Practice problem:

1. Think about what the results would be for the following expressions, and then type them in to verify your answers:

$1 \backslash 2$
 $-5 \wedge 2$
 $(-5) \wedge 2$
 $10 - 6/2$
 $5 * 4/2 * 3$

2. What would happen if you use the name of a function , eg abs, as a variable name?
3. Use plus operator and check the results.

Also, if a function name is typed incorrectly, MATLAB will suggest a correct name.

```
>> abso(-4)
Undefined function or variable 'abso'.
Did you mean:
>> abs(-4)
```



Constant/random number

pi 3.14159....

i $\sqrt{-1}$

j $\sqrt{-1}$

inf infinity ∞

NaN stands for "not a number," such as the result of 0/0

Practice problem:

```
>> rand
ans =
    0.8147
>> rand
ans =
    0.9058
```

Generate a random

- real number in the range [0,1)
- real number in the range [0, 100)
- real number in the range [20, 35]
- integer in the inclusive range from 1 to 100
- integer in the inclusive range from 20 to 35



Relational Expression

Expressions that are conceptually either true or false are called *relational expressions*; they are also sometimes called *Boolean expressions* or *logical expressions*. These expressions can use both *relational operators*, which relate two expressions of compatible types, and *logical operators*, which operate on **logical** operands.

The relational operators in MATLAB are:

Operator	Meaning
>	greater than
<	less than
>=	greater than or equals
<=	less than or equals
==	equality
~=	inequality

Example:

```
>> 3 < 5  
ans =  
      1
```

```
>> 2 > 9  
ans =  
      0  
>> class(ans)  
ans =  
logical
```



Practice question:

1. Assume that there is variable x that has been initialized, what would be the value of expression $3 < x < 5$, if the value of x is 4? what if the value is 7?



Practice question:

Think about what would be produced by the following expressions, and then type them in to verify your answers.

```
3 == 5 + 2
```

```
'b' < 'a' + 1
```

```
10 > 5 + 2
```

```
(10 > 5) + 2
```

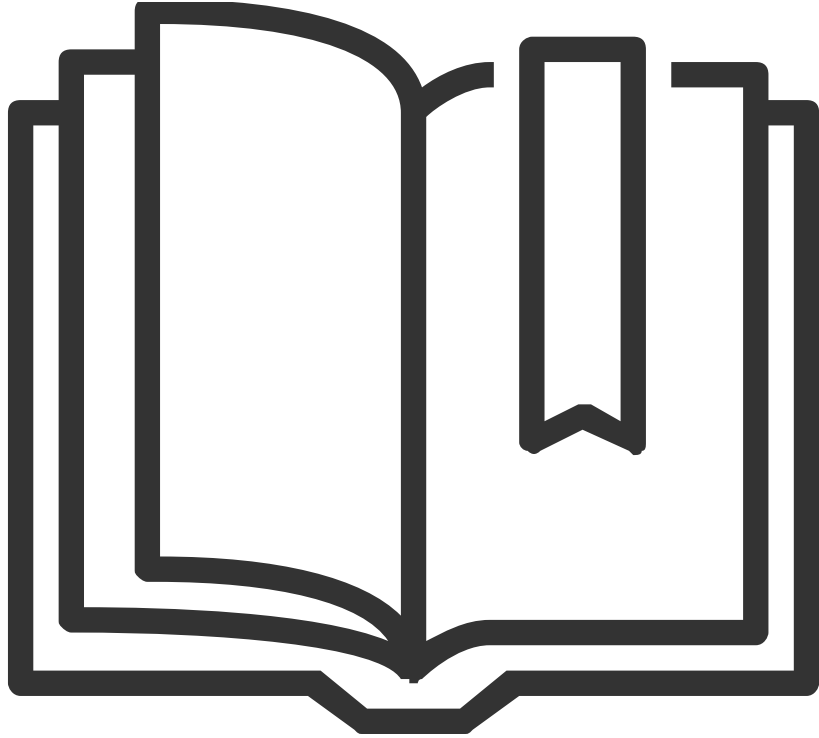
```
'c' == 'd' - 1 && 2 < 4
```

```
'c' == 'd' - 1 || 2 > 4
```

```
xor('c' == 'd' - 1, 2 > 4)
```

```
xor('c' == 'd' - 1, 2 < 4)
```

```
10 > 5 > 2
```

Thank you for listening

10:45AM

IT Workshop/MATLAB