ECE 101 Exploring Electrical Eng.

- ***MATLAB***
- Arithmetic Operators
- Elementary Math Functions

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Arithmetic Operators (Scalar)

Operation	Operator	Key
addition	+	plus
subtraction & negation	–	minus
multiplication	*	asterisk
right division	/	slash
power	^	caret
grouping	( )	parentheses

Operator Precedence:

Operation	Association	Precedence
parentheses		highest
raise to a power		↑
multiplication, division	Left to Right	
addition, subtraction	Left to Right	lowest

- Precedence → specifies which operator is evaluated first when operators of *different* precedence are adjacent
- Association → specifies which operator is evaluated first when operators of the *same* precedence are adjacent

Try these examples (using MATLAB as calculator):

a) `3 + 4` → `7`

b) `-1 + 3` → `2`

c) `17.52 * 3.14` → `55.0128`

d) `3^1.5` → `5.1962`

e) `3^(3/2)` → `5.1962`

f) `3^3/2` → `13.5`

g) `2*(4+6)` → `20`

h) `2*4+6` → `14`

j) `2 - 2 * 2 ^ 2 * 2 - 2` → `-16`

Elementary Math Functions

Function	Description	
`abs(x)`	Absolute value	$\lvert x \rvert$
`exp(x)`	Exponential	e^x
`factorial(x)`	Factorial function	$x!$
`log(x)`	Natural logarithm	$\log_e(x) \equiv \ln(x)$
`log10(x)`	Base 10 logarithm	$\log_{10}(x)$
`sqrt(x)`	Square root	$\sqrt{x}$

Note: classic mistake is to exchange or confuse log(x) and log10(x) !

Function	Description (*x* in degrees)	Inverse Function
`sind(x)`	Sine of x	`asind(x)`
`cosd(x)`	Cosine of x	`acosd(x)`
`tand(x)`	Tangent of x	`atand(x)`
		`atan2d(x)`
`secd(x)`	Secant of x	`asecd(x)`

MATLAB also supports radians versions of these trig functions, e.g. in sind(x) x is in degrees, but in sin(y) y is in radians.

Example:

`sin(pi/2)` $\rightarrow 1$ `sind(90)` $\rightarrow 1$

`asin(1)` $\rightarrow 1.5708$ `asind(1)` $\rightarrow 90$

Examples to try:

a) $\dfrac{3^2+(-4)^2}{\ln(2)}$ $\rightarrow$ `3^2+(-4)^2)/log(2)`

b) $\dfrac{\cos\left(\dfrac{\pi}{3}\right)}{1-5^{1/3}}$ $\rightarrow$ `cos(pi/3)/(1-5^(1/3))`

c) $\sqrt{2}e^{-(0.2)^2}$ $\rightarrow$ `sqrt(2)*exp(-0.2^2)`

d) $\log(|-5.2|)$ $\rightarrow$ `log10(abs(-5.2))`