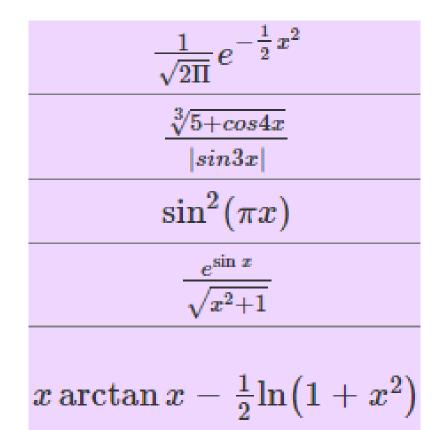# Tutorial 04

L07 – Data types and operators

L08 – Elementary Mathematical functions

Exercise

- Write MATLAB commands for following mathematical expressions:

$$\frac{1}{\sqrt{2\Pi}} e^{-\frac{1}{2}x^2}$$

$$\frac{\sqrt[3]{5+cos4x}}{|sin3x|}$$

$$sin^2(\pi x)$$

$$\frac{e^{sin\,x}}{\sqrt{x^2+1}}$$

$$x\,arctan\,x - \frac{1}{2}ln(1+x^2)$$

What is the value of these expressions for x=1.2?

ANS: (Verify using MATLAB)

0.1942
3.8866
0.3455
1.6259
0.6053

ANSWER

- (1/sqrt(2*pi))*exp(-(1/2)*x^2)

- nthroot((5+cos(4*x)),3)/(abs(sin(3*x)))

- sin(pi*x)^2

- exp(sin(x))/ (sqrt(x^2 +1))

- x*atan(x)- (1/2)*log(1+x^2)

$$\frac{1}{\sqrt{2\Pi}} e^{-\frac{1}{2}x^2}$$

$$\frac{\sqrt[3]{5+cos4x}}{|sin3x|}$$

$$\sin^2(\pi x)$$

$$\frac{e^{\sin x}}{\sqrt{x^2+1}}$$

$$x \arctan x - \frac{1}{2}\ln\left(1+x^2\right)$$

Exercise

- You go to the supermarket only to find you left your wallet at home. After hunting on the floor of your rather messy car, you find Rs 100 and decide to buy some apples, which are Rs 35 each.

- Use the **floor** and **rem** functions to find out the answers to the following questions:

- How many apples can you buy?   -   **floor(100/35)**
- How much change do you have left?   -   **Rem(100,35)**

Exercise

1. You have Rs 50. Each item costs Rs 3.35. How many items can you buy and how much change will you have left?

ANS :   **floor(50/3.35) ,   rem(50,3.35)**

1. There are 211 students to be arranged into tutorial classes which can hold 24 students per class. Use MATLAB commands to determine the number of tutorial classes needed and how many spare places are left.

ANS :   **round(211/24);   rem(9*24,211)**

Exercise

- The skaters were given a random number for this illustration, but once the race is over, we'd like to sort the table in ascending order, based on the times in the second column.

Skater Number	Time (min)
1	42.093
2	42.089
3	41.935
4	42.497
5	42.002

skating_results = [1 42.093; 2 42.089; 3 41.935;4 42.497; 5 42]
sortrows(skating_results,2)

HINT : **sortrows**(x,n) - Sorts the rows in a matrix on the basis of the values in column n

Exercise

- Given two complex numbers
- $c = 5 + 3i$, $d = 1 - i$
- Find the real and imaginary part of c and d in MATLAB.
- **real(c), imag(c) , real(d), imag(d)**
- Use MATLAB to find c+d, c-d, cd, c/d
- Use the direct method supported by MATLAB and the specific complex functions abs, angle, imag, real, conj, complex, etc. together with the formulas for complex numbers .
- Find also magnitude and angle. Find also the complex conjugate.

ANSWER

- c=5+3i;
- d=1-i;
- disp(c+d);
- z = c + d

- z_real = real(c) + real(d);
- z_imag = imag(c) + imag(d);
- z = complex(z_real,z_imag)

- r=abs(z)
- theta=angle(z)
- complconj=conj(z)

- disp(c-d)
- z = c - d
- z_real = real(c) - real(d);
- z_imag = imag(c) - imag(d);
- z = complex(z_real,z_imag);

- disp(c*d)
- z = c*d
- z_abs = abs(c)*abs(d);
- z_angle = angle(c) + angle(d);
- z_real = z_abs*cos(z_angle);
- z_imag = z_abs*sin(z_angle);
- z = complex(z_real,z_imag);

ANSWER

- disp(c/d)
- z = c/d;
- z_abs = abs(c)/abs(d);
- z_angle = angle(c) - angle(d);
- z_real = z_abs*cos(z_angle);
- z_imag = z_abs*sin(z_angle);
- z = complex(z_real,z_imag);