

# Tutorial 01

L01 - Getting Started with MATLAB

L02 - Matrices and Arrays

# Exercise

- Create a 1x10 array using colon operator ( : ), in which the first five numbers are even (between 2 and 10) and last five numbers are odd (between 1 and 9).
- **ANS >> A=[2:2:10 1:2:9]**
- Create a 6 x 6 array with **rand()** function. Using a colon operator, retrieve the upper left 3 x 3 corner of the array. See help for information on **rand()**.
- **ANS >> A=rand(6);**
- **>> A(1:3,1:3);**

# Exercise

- A tourist group took a trip on a train to Goa from Manipal, at Rs 16 per child and Rs 20 per adult for a total of Rs 696=00.
- They took the bus back to Manipal at Rs 20 per child and Rs 30 per adult for a total of Rs 980=00.
- How many children, and how many adults were there in the tourist group?
- HINT :  **$A * \text{inv}(A) = I$  (I is identity matrix)**
- **Use inverse of a matrix.**

```
>> A=[2 3;4 5];
```

```
>> A
```

```
A =
```

```
     2     3
     4     5
```

```
>> inv(A)
```

```
ans =
```

```
   -2.5000    1.5000
    2.0000   -1.0000
```

```
>> A*inv(A)
```

```
ans =
```

```
     1     0
     0     1
```

# MATRIX division – LEFT and RIGHT

- $A / B = A \times \text{inv}(B)$  – right division     $8/4 = 8 * 4^{-1}$
- $A \setminus B = \text{inv}(A) \times B$  – left division     $8 \setminus 4 = 4/8 = 8^{-1} * 4$
- $A X = B \Rightarrow X = A \setminus B$
- $X A = B \Rightarrow X = B / A$

# Solution

- $[X] [A] = [B]$
- $[\text{numOfAdults } \text{numOfChildren}] \begin{bmatrix} 20 & 30 \\ 16 & 20 \end{bmatrix} = [696 \ 980];$
- $[X] = [B] \text{inv}(A);$  or  $[X] = [B] / [A];$
- $[\text{numOfAdults } \text{numOfChildren}] = [22 \ 16]$
- Ref: <https://www.mathsisfun.com/algebra/matrix-inverse.html>

# Exercise

- Solve Linear Algebraic Equations – Using left division operator (\)

- $7x - 2y + 3z = 5$
- $6x + 12y + 4z = 70$
- $2x + 8y - 9z = 64$

- Find the values of  $x$ ,  $y$ ,  $z$

- Hint :  $A X = B$

```
>> A = [7 -2 3; 6 12 4; 2 8 -9];  
>> B = [ 5; 70; 64;];  
>> X = A\B; or X = inv(A)*B
```

```
X =
```

```
    3  
    5  
   -2
```

# Exercise

- Solve:

- $-5x - 3y + 7z = 75$
- $6x - 4y + 8z = 112$
- $14x + 9y - 5z = -67$

- Find  $x, y, z$

```
>> A = [-5 -3 7; 6 -4 8; 14 9 -5];  
>> B = [ 75; 112; -67;];  
>> X = A\B; or X = inv(A)*B
```

X =

2  
-5  
10

# Exercise

- The following table gives data for the distance traveled along ve truck routes and the corresponding time required to traverse each route. Use the data to compute the average speed required to drive each route. Find the route that has the highest average speed.

	1	2	3	4	5
Distance (mi)	560	440	490	530	370
Time (hr)	10.3	8.2	9.1	10.1	7.5

```
ANS : >> distance=[560 440 490 530 370];  
>> timetaken = [10.3 8.2 9.1 10.1 7.5];  
>> averagespeed = (distance./timetaken);  
>> [ maxspeed routeno] = max(averagespeed);
```