# IP Lab01

**Jainil Trivedi(B4)** (CE171)

1. **Create the following matrix A**: $A = \begin{bmatrix} 43 & 21 & 22 & 11 \\ -5 & 6 & 34 & -21 \\ 12 & 17 & -18 & 42 \end{bmatrix}$

```
>> A = [43,21,22,11;-5,6,34,-21;12,17,-18,42;]

A =

    43    21    22    11
    -5     6    34   -21
    12    17   -18    42
```

   A. **Create a four element row vector named va that contains the elements of the second row of A.**

```
>> va = A(2,:)

va =

    -5     6    34   -21

>>
```

   B. **Create a three element row vector named vb that contains the elements of the third column of A.**

```
>> vb = A(:,3)

vb =

    22
    34
   -18
```

**C. Create an eight element row vector named vc that contains the elements of the first and third rows of A.**

```
vc =

    43    21    22    11

>> vc (1,5:8) = A(3,:)

vc =

    43    21    22    11    12    17   -18    42
```

**D. Create a six element row vector named vd that contains the elements of the second and fourth columns of A.**

```
vd =

    21
     6
    17

>> vd(4:6,1) = A(:,4)

vd =

    21
     6
    17
    11
   -21
    42
```

2. Create the following three matrices:

$$A = \begin{bmatrix} 5 & 2 & 4 \\ 2 & -5 & 8 \\ 1 & -3 & -7 \end{bmatrix} \qquad B = \begin{bmatrix} 10 & 7 & 3 \\ -11 & 5 & 8 \\ 4 & -3 & -7 \end{bmatrix} \qquad C = \begin{bmatrix} 6 & 9 & -4 \\ 10 & 5 & 8 \\ 2 & -3 & 7 \end{bmatrix}$$

a) Calculate $A + B$ and $B + A$ to show that addition of matrices is commutative.
b) Calculate $A + (B + C)$ and $(A + B) + C$ to show that addition of matrices is associative.
c) Calculate $3(A + C)$ and $3A + 3C$ to show that, when matrices are multiplied by a scalar, the multiplication is distributive.
d) Calculate $A * (B + C)$ and $A * B + A * C$ to show that matrix multiplication is distributive.

```
>> A = [5,2,4;2,-5,8;1,-3,-7;]

A =

     5     2     4
     2    -5     8
     1    -3    -7

>> B=[10,7,3;-11,5,8;4,-3,-7;]

B =

    10     7     3
   -11     5     8
     4    -3    -7

>> C = [6,9,-4;,,8;2,-3,7;]
 C = [6,9,-4;,,8;2,-3,7;]
                ↑
Invalid expression. When calling a function o
parentheses. Otherwise, check for mismatched

>> C = [6,9,-4;,10,5,8;2,-3,7;]

C =

     6     9    -4
    10     5     8
     2    -3     7

>>
```

**A. Calculate A + B and B + A to show that addition of matrices is commutative.**

```
ans =

    15     9     7
    -9     0    16
     5    -6   -14

>> B+A

ans =

    15     9     7
    -9     0    16
     5    -6   -14
```

**B. Calculate A + (B + C) and (A + B) + C to show that addition of matrices is associative.**

```
ans =

    21    18     3
     1     5    24
     7    -9    -7

>> (A+B)+C

ans =

    21    18     3
     1     5    24
     7    -9    -7
```

**C. Calculate 3(A + C) and 3A + 3C to show that, when matrices are multiplied by a scalar, the multiplication is distributive.**

```
>> 3*(A+C)

ans =

    33    33     0
    36     0    48
     9   -18     0

>> 3*A+3*C

ans =

    33    33     0
    36     0    48
     9   -18     0
```

**D. Calculate A * (B + C) and A * B + A * C to show that matrix multiplication is distributive.**

```
>> A*(B+C)

ans =

   102    76    27
    85   -66   -82
   -23    28   -49

>> A*B+A*C

ans =

   102    76    27
    85   -66   -82
   -23    28   -49
```

**3. Create an array A = [1 2 3 4 5 6] and using built in functions for array find**

**a. length of A**

**b. average of the elements of A**

**c. Maximum element of A**

**d. Minimum element of A**

**e. Sum of all the elements of A**

```
A =

     1     2     3     4     5     6

>> length(A)

ans =

     6

>> mean(A)

ans =

    3.5000

>> max(A)

ans =

     6

>> min(A)

ans =

     1

>> sum(A)

ans =

    21
```

4. Calculate:

$$\frac{3^7 \log 76}{7^3 + 546} + \sqrt[3]{910}$$

```
>> (pow2(3,7)*log(76))/(pow2(7,3)+546) + nthroot(910,3)

ans =

   12.4530
```

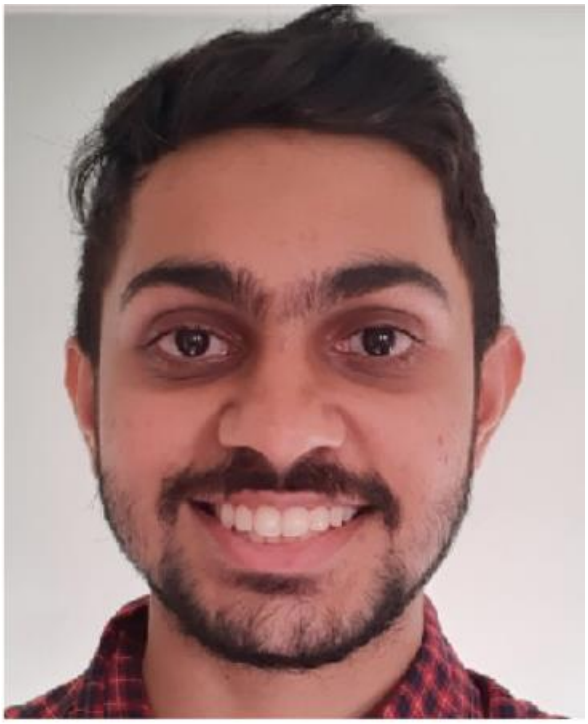
**5. Using the ones and zeros commands, create a 4 x 6 matrix in which the first two rows are 0's and the next two rows are 1's.**

```
>> A = zeros(4,6)

A =

     0     0     0     0     0     0
     0     0     0     0     0     0
     0     0     0     0     0     0
     0     0     0     0     0     0

>> A (3:4,:) = [1,1,1,1,1,1;]
Unable to perform assignment because the
and the size of the right side is 1-by-6

>> B = ones(2,6)

B =

     1     1     1     1     1     1
     1     1     1     1     1     1

>> A(3:4,:) = B

A =

     0     0     0     0     0     0
     0     0     0     0     0     0
     1     1     1     1     1     1
     1     1     1     1     1     1
```

# Image Processing Toolbox

**1. Take your own photo (RGB image) and create the following images and save them for future use**

a) **Keep your face only and crop the rest of the part**



b) **Take your own photo and**
c) **gray scale image**
d) **Black and White image**
e) **Over exposed image**
f) **Under exposed image**
g) **Resize the image to 256 x 256**






3. For the gray scale image from previous question,

a. Flip your image vertically

```
for i=1:981
    ver_flip(981-i+1,:)=me_g(i,:);
end
imshow(ver_flip);
```

b. Create the mirror image

```
for i=1:737
    mirror_img(:,737-i+1)=me_g(:,i);
end
imshow(mirror_img);
```

c. Rotate the image by 90 degrees.

```
for i=1:737
        img_ninety(:,737-i+1)=me_g(i,:);
end
imshow(img_ninety);
```

d. Rotate the image by 270 degrees.

```
for i=1:737
    img_twoseventy(981-i+1,:)=me_g(:,i);
end
imshow(img_twoseventy);
```