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| 3 | Write a program to find the maximum number out of the given three numbers. | | | | | | | | | | | | |
| 4 | <p>An electric power distribution company charges its domestic consumers as follows:</p> <table border="1"><thead><tr><th><i>Units</i></th><th><i>Rate of Charge</i></th></tr></thead><tbody><tr><td>0-100</td><td>Rs. 1 per unit</td></tr><tr><td>101-300</td><td>Rs. 100 plus Rs. 1.25 per unit in excess of 100</td></tr><tr><td>301-500</td><td>Rs. 350 plus Rs. 1.50 per unit in excess of 300</td></tr><tr><td>500 and above</td><td>Rs. 650 plus Rs. 1.75 per unit in excess of 500</td></tr></tbody></table> <p>Write a program that read the customer number & power consumed and prints the amount to be paid by the customer. Note that output should be well formatted.</p> | <i>Units</i> | <i>Rate of Charge</i> | 0-100 | Rs. 1 per unit | 101-300 | Rs. 100 plus Rs. 1.25 per unit in excess of 100 | 301-500 | Rs. 350 plus Rs. 1.50 per unit in excess of 300 | 500 and above | Rs. 650 plus Rs. 1.75 per unit in excess of 500 | | |
| <i>Units</i> | <i>Rate of Charge</i> | | | | | | | | | | | | |
| 0-100 | Rs. 1 per unit | | | | | | | | | | | | |
| 101-300 | Rs. 100 plus Rs. 1.25 per unit in excess of 100 | | | | | | | | | | | | |
| 301-500 | Rs. 350 plus Rs. 1.50 per unit in excess of 300 | | | | | | | | | | | | |
| 500 and above | Rs. 650 plus Rs. 1.75 per unit in excess of 500 | | | | | | | | | | | | |
| 5 | Write a program to check whether the entered number is Armstrong or not. | | | | | | | | | | | | |
| 6 | Write a program to print a multiplication table of the entered number. | | | | | | | | | | | | |
| 7 | Write a program to generate the following pattern: 1 2 3 4 5 6 7 8 9 10 | | | | | | | | | | | | |

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| 8 | Write a program to create a list of students' marks with user-defined values and find the maximum. | | |
| 9 | Write a program to create a list of numbers and swap the content with the next value divisible by 5. For example: list = [4,25,31,7,35,44,55] Output: [25,4,31,35,7,55,44] | | |
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| 12 | Write a program to convert a python list to a NumPy array. | | |
| 13 | Write a program to create a dataframe named new_frame of class averages of different subjects () for premidterm and midterm examination and store the data in the columns 'premidterm' and 'midterm'. Assign subject names as row index and Display the frame | | |
| 14 | Write a program to represent the data the data frame created in previous question on bar chart (xlabel=subjects,ylabel=class average).create subplots for 'premidterm' and 'midterm' | | |
| 15 | Write a program to calculate variance and standard deviation for the given data: [33,44,55,67,54,22,33,44,56,78,21,31,43,90,21,33,44,55,87] | | |
| 16 | Write a menu-driven program to calculate the mean, mode and median for the given data: [5,6,1,3,4,5,6,2,7,8,6,5,4,6,5,1,2,3,4] | | |

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| 3 | Unit 5 Computer Vision | | |
| 17 | Visit https://www.w3schools.com/colors/colors_rgb.asp . On the basis of this online tool, try and write answers of all the below-mentioned questions. <ul style="list-style-type: none"> • What is the output colour when you put R=G=B=255? • What is the output colour when you put R=G=255,B=0? • What is the output colour when you put R=255,G=0,B=255? • What is the output colour when you put R=0,G=255,B=255? • What is the output colour when you put R=G=B=0? • What is the output colour when you Put R=0,G=0,B=255? • What is the output colour when you Put R=255,G=0,B=0? • What is the output colour when you put R=0,G=255,B=0? • What is the value of your colour? | | |
| 18 | Do the following tasks in OpenCV. <ul style="list-style-type: none"> • Load an image & Give the title of the image • Change the image to grayscale • Print the shape of image • Display the maximum and minimum pixels of image • Crop the image. • Save the Image | | |

1. Write a program to compute the net run rate for a tournament.

Code:

```
tn=input("Enter Team name:")
n=int(input("Enter no. of matches played:"))
to=0 #variable to store total overs played
tr=0 #variable to store total runs
tagr=0 #variable to store total runs conceded
togr=0 #variable to store total overs bowled
for i in range(n):
    r=int(input("Enter runs scored in match"+str(i+1)+":"))
    o=int(input("Enter overs played:"))
    tr=tr+r
    to=to+o
    agr=int(input("Enter runs conceded in match"+str(i+1)+":"))
    ogr=int(input("Enter overs bowled:"))
    tagr+=agr
    togr+=ogr
nrr=(tr/to)-(tagr/togr) #to find the net run rate
print("Net runrate is:",nrr)
```

```
Enter Team name:India
Enter no. of matches played:3
Enter runs scored in match1:254
Enter overs played:47
Enter runs conceded in match1:1253
Enter overs bowled:50
Enter runs scored in match2:199
Enter overs played:50
Enter runs conceded in match2:110
Enter overs bowled:35
Enter runs scored in match3:225
Enter overs played:50
Enter runs conceded in match3:103
Enter overs bowled:41
Net runrate is: 0.9138321995464853
```

2. Write a program to check whether the given character is an uppercase letter or lowercase letter or a digit or a special character.

Code:

```
#Input the character to check
ch=input("Enter Any Character:")
if ch.isupper():
    print(ch, " is an upper case letter")
elif ch.islower():
    print(ch, " is a lower case letter")
elif ch.isdigit():
    print(ch, " is a digit")
elif ch.isspace():
    print(ch, " is a space")
else:
    print(ch," is a special character")
```

```
Enter Any Character:A
A is an upper case letter
```

3. Write a program to find the maximum number out of the given three different numbers.

```
#Take input or three number to compare
```

```
n1=int(input("Enter the Number1:"))
```

```
n2=int(input("Enter the Number2:"))
```

```
n3=int(input("Enter the Number3:"))
```

```
if n1>n2 and n1>n3:
```

```
    print(n1, " - Number 1 is greater")
```

```
elif n2>n1 and n2>n3:
```

```
    print(n2, " - Number 2 is greater")
```

```
elif n3>n1 and n3>n2:
```

```
    print(n3, " - Number 3 is greater")
```

```
else:
```

```
    print("All are same")
```

```
Enter the Number1:45
Enter the Number2:32
Enter the Number3:89
89 - Number 3 is greater
...
```

4. An electric power distribution company charges its domestic consumers as follows.

Write a program that read the customer number & power consumed and prints the amount to be paid by the customer. Note that output should be well formatted.

| Consumption Units | Rate of Charge |
|-------------------|---|
| 0-100 | Rs. 1 per unit |
| 101-300 | Rs. 100 plus Rs. 1.25 per unit in excess of 100 |
| 301-500 | Rs. 350 plus Rs. 1.50 per unit in excess of 300 |
| 501 and above | Rs. 650 plus Rs. 1.75 per unit in excess of 500 |

```
#Input Data
```

```
cno=int(input("Enter Consumer Number:"))
```

```
pc=int(input("Enter power consumed:"))
```

```
if pc>0 and pc<=100:
```

```
    bill_amt=pc*1
```

```
elif pc>100 and pc<=300:
```

```
    bill_amt=100+(pc-100)*1.25
```

```
Enter Cusumer Number:1002
Enter power consumed:230
.....
                ABC Power Company Ltd.
.....
Consumer Number: 1002
Consumed Units: 230
-----
Bill Amount: 262.5
```

```

elif pc>300 and pc<=500:
    bill_amt=350+(pc-300)*1.50
elif pc>500:
    bill_amt=650+(pc-500)*1.75
else:
    print("Invalid Power Consumed Units")
print("\t\tABC Power Company Ltd.")
print("~"*60)
print("Consumer Number:",cno)
print("Consumed Units:",pc)
print("_____")
print("Bill Amount:",bill_amt)

```

5. Write a program to check whether the entered number is Armstrong or not.

```

n=int(input("Enter number to check:"))
#Store the original number into temporary variable
t=n
s=0
#Computing the sum of cube of each digit and iterating until n=0
while n!=0:
    r=n%10
    s=s+(r**3)
    n//=10
#Checking & displaying whether armstrong or not
if t==s:
    print(s," is Armstrong number")
else:
    print(s," is not an Artmstrong number")

```

```

Enter number to check:153
153 is Armstrong number

```

6. Write a program to print a multiplication table of the entered number.

```
#Take input to accept a number for printing Multiplication table
```

```
n=int(input("Enter number to print multiplication table:"))
```

```
#Take for loop for multiple
```

```
for i in range(1,11):
```

```
    print(n," x ", i, " = ", n*i )
```

```
Enter number to print multiplication table:8
8 x 1 = 8
8 x 2 = 16
8 x 3 = 24
8 x 4 = 32
8 x 5 = 40
8 x 6 = 48
8 x 7 = 56
8 x 8 = 64
8 x 9 = 72
8 x 10 = 80
```

7. Write a program to generate the following pattern:

```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

```
#Take input for n lines
```

```
n=int(input("Enter n:"))
```

```
#Generating Pattern
```

```
k=1
```

```
for i in range(1,n+1):
```

```
    for j in range(1,i+1):
```

```
        print(k,end=" ")
```

```
        k=k+1
```

```
    print("\n")
```

```
print()
```

```
Enter n:5
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

8. Write a program to create a list of students' marks with user-defined values and find the maximum.

```
#Take input for n lines
n=int(input("Enter no. of subjects:"))
#Creating empty list
list1=[]
#Accepting marks and appending marks into the list
for i in range(n):
    m=int(input("Enter marks:"))
    list1.append(m)
print("Maximum marks scored:",max(list1))
```

```
Enter no. of subjects:5
Enter marks:20
Enter marks:52
Enter marks:41
Enter marks:63
Enter marks:88
Maximum marks scored: 88
```

9. Write a program to create a list of numbers and swap the content with the next value divisible by 5. For example: list = [4,25,31,7,35,44,55]Output: [25,4,31,35,7,55,44]

```
#Take input for no of subjects
n=int(input("Enter no. of subjects:"))
#Creating empty list
list1=[]
#Accepting marks and appending marks into the list
for i in range(n):
    m=int(input("Enter marks:"))
    list1.append(m)
#Swaping elements
for i in range(len(list1)) :
    if list1[i] % 5 == 0 :
        list1[ i ], list1[i-1] = list1[ i - 1 ] , list1[i]
print("List after swap:",list1)
```

```
Enter no. of subjects:5
Enter marks:21
Enter marks:55
Enter marks:33
Enter marks:45
Enter marks:25
List after swap: [55, 21, 45, 25, 33]
```


10. Write a program to count the frequency of every element in a given list.

```
#Creating empty list
list1 = []
#Take input for n no. of elements
n=int(input("Enter the no. of elements:"))
#Append the values into the list
for i in range(n):
    val=int(input("Enter value "+str(i+1)+":"))
    list1.append(val)
#Declaring a dictionary object to store the data
f = {} #Initially dictionary will be empty
print(f) #to check the dictionary
for i in list1:
    if (i in f):
        f[i] += 1
    else:
        f[i] = 1
    print(f)
print(f.items()) #to check the index and value inside the dictionary
#Displaying the data
for i, j in f.items():
    print(i, "->", j)
```

```
Enter the no. of elements:5
Enter value 1:24
Enter value 2:21
Enter value 3:24
Enter value 4:23
Enter value 5:24
24 -> 3
21 -> 1
23 -> 1
```

Unit 4 Data Science Programs

11. Write a program to create a 2D array using NumPy.

```
#import numpy package

import numpy as np

#Creating array using arange() function

arr=np.arange(5,45,5)

#reshaping array for 2D

arr=arr.reshape(2,4)

#printing array

print(arr)
```

```
[[ 5 10 15 20]
 [25 30 35 40]]
```

12. Write a program to convert a python list to a NumPy array.

```
#Import NumPy Package

import numpy as np

#Creating empty list

l = []

#Take input for n no. of elements

n=int(input("Enter the no. of elements:"))

#Append the values into the list

for i in range(n):

    val=int(input("Enter value "+str(i+1)+":"))

    l.append(val)

#Converting list into numpy array

arr=np.array(l)

print("Array:",arr)
```

```
Enter the no. of elements:5
Enter value 1:11
Enter value 2:23
Enter value 3:45
Enter value 4:67
Enter value 5:89
Array: [11 23 45 67 89]
```

13. Write a program to create a dataframe named new_frame of class averages of different subjects () for premidterm and midterm examination and store the data in the columns 'premidterm' and 'midterm'. Assign subject names as row index and Display the frame

| | premidterm | midterm |
|-------|------------|---------|
| sst | 70 | 70 |
| maths | 68 | 69 |
| Sci | 71 | 70 |
| 2lang | 75 | 75 |
| Eng | 73 | 73 |
| AI | 70 | 74 |

```
import pandas as pd
#Creating lists for data
subjects=['sst', 'maths', 'Sci', '2lang','Eng', 'AI']
```

```
#creating a dictionary with class averages
clas_avg={'premidterm':[70,68,71,75,73,70],'midterm':[70,69,70,75,73,74]}
```

```
#Creating data frame with the given data
newframe=pd.DataFrame(clas_avg,index=subjects)
print(newframe)
```

14. Write a program to represent the data the data frame created in previous question on bar chart (xlabel=subjects,ylabel=class average).create subplots for 'premidterm' and 'midterm'.

```
import matplotlib.pyplot as plt
import pandas as pd
#Creating lists for data
subjects=['sst', 'maths', 'Sci', '2lang','Eng', 'AI']
```

```
#creating a dictionary with class averages
clas_avg={'premidterm':[70,68,71,75,73,70],'midterm':[70,69,70,75,73,74]}
```

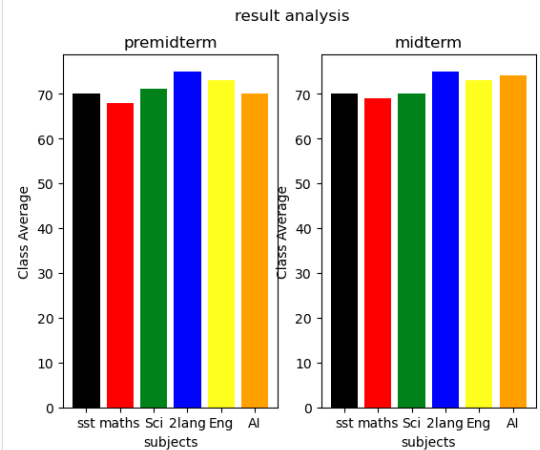
```
#Creating data frame with the given data
newframe=pd.DataFrame(clas_avg,index=subjects)
print(newframe)
```

```
#Creating bar graph with different bar colours
# for PRE MIDTERM
plt.subplot(1, 2, 1)
plt.bar(subjects,clas_avg['premidterm'],color=['black','red','green','blue','yellow','orange'])
plt.xlabel('subjects')
plt.ylabel('Class Average')
plt.title('premidterm')
```

```
# for MIDTERM
plt.subplot(1, 2, 2)
```

```
plt.bar(subjects,clas_avg['midterm'],color=['black',
'yellow','orange'])
plt.xlabel('subjects')
plt.ylabel('Class Average')
plt.title('midterm')
```

'red', 'green', 'blue',



15. Write a program to calculate the mean, mode and median for the given

data: [5,6,1,3,4,5,6,2,7,8,6,5,4,6,5,1,2,3,4]

```
import statistics
l=[5,6,1,3,4,5,6,2,7,8,6,5,4,6,5,1,2,3,4]
#Display mean, mode and median value using functions
print("Mean Value:%.2f"%statistics.mean(l))
print("Mode Value:%.2f"%statistics.mode(l))
print("Median Value:%.2f"%statistics.median(l))
```

OR

```
import numpy as np
import statistics as st
array1 = np.array([5,6,1,3,4,5,6,2,7,8,6,5,4,6,5,1,2,3,4])
print(array1)
print("\nMean: ", np.mean(array1))
print("\nMedian: ", np.median(array1))
print("\nMode: ", st.mode(array1))
```

Mean Value:4.37
Mode Value:5.00
Median Value:5.00

16. Write a program to calculate variance and standard deviation for the given

data:[33,44,55,67,54,22,33,44,56,78,21,31,43,90,21,33,44,55,87]

```
#import statistics

import statistics

#Creating list

l=[33,44,55,67,54,22,33,44,56,78,21,31,43,90,21,33,44,55,87]

#Display varaince and standard deviation value using functions

print("Variance:%.2f"%statistics.variance(l))

print("Standard Deviation:%.2f"%statistics.stdev(l))
```

```
Variance:439.72
Standard Deviation:20.97
```

Unit 5 Computer Vision

17. Visit [this link](https://www.w3schools.com/colors/colors_rgb.asp) (https://www.w3schools.com/colors/colors_rgb.asp). On the basis of this online tool, try and write answers of all the below-mentioned questions.

- What is the output colour when you put R=G=B=255?
- What is the output colour when you put R=G=255,B=0?
- What is the output colour when you put R=255,G=0,B=255?
- What is the output colour when you put R=0,G=255,B=255?
- What is the output colour when you put R=G=B=0?
- What is the output colour when you Put R=0,G=0,B=255?
- What is the output colour when you Put R=255,G=0,B=0?
- What is the output colour when you put R=0,G=255,B=0?

- What is the value of your colour?

Solution:1.

1. White



18.Do the following tasks in OpenCV.

- Load an image & Give the title of the image
- Change the image to grayscale
- Print the shape of image
- Display the maximum and minimum pixels of image
- Crop the image.
- Save the Image

1. Load Image and Give the title of image

```
#import required module cv2, matplotlib and numpy
```

```
import cv2
```

```
import matplotlib.pyplot as plt
```

```
import numpy as np
```

```
#Load the image file into memory
```

```
img = cv2.imread('octopus.png')
```

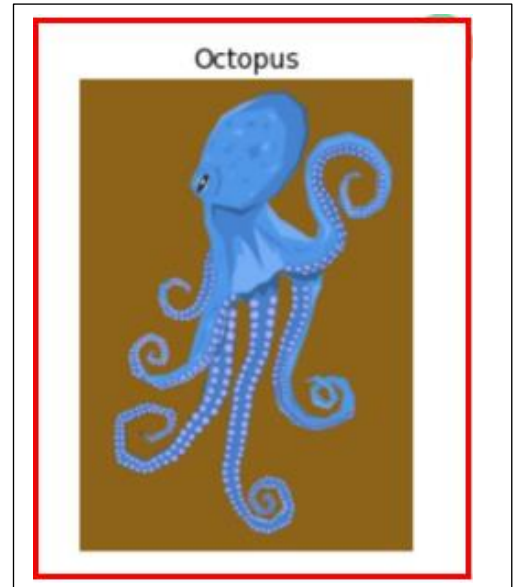
```
#Display Image
```

```
plt.imshow(img)
```

```
plt.title('Octopus')
```

```
plt.axis('off')
```

```
plt.show()
```



2. Change the colour of image and Change the image to grayscale

```
#import required module cv2, matplotlib and numpy
```

```
import cv2
```

```
import matplotlib.pyplot as plt
```

```
import numpy as np
```

```
#Load the image file into memory
```

```
img = cv2.imread('octopus.png')
```

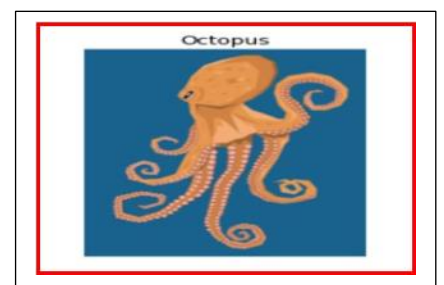
```
#Changing image colour image colour
```

```
plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
```

```
plt.title('Octopus')
```

```
plt.axis('off')
```

```
plt.show()
```



3. Print the shape of image

```
import cv2
```

```
img = cv2.imread('octopus.png',0)
```

```
(1920, 1357)
```

```
print(img.shape)
```

4. Display the maximum and minimum pixels of image

```
import cv2
```

```
img = cv2.imread('octopus.png',0)
```

```
print(img.min())
```

```
0  
255
```

```
print(img.max())
```

5. Crop the image and extract the part of an image

```
import cv2
```

```
import matplotlib.pyplot as plt
```

```
img = cv2.imread('octopus.png')
```

```
pi=img[150:400,100:200]
```

```
plt.imshow(cv2.cvtColor(pi, cv2.COLOR_BGR2RGB))
```

```
plt.title('Octopus')
```

```
plt.axis('off')
```

```
plt.show()
```

6. Save the Image

```
import cv2
```

```
import matplotlib.pyplot as plt
```

```
img = cv2.imread('octopus.png')
```

```
plt.imshow(img)
```

```
cv2.imwrite('oct.jpg',img)
```

```
plt.title('Octopus')
```

```
plt.axis('off')
```

```
plt.show()
```

