COMSATS UNVERISTY ISLAMABAD

Artificial Intelligence
Lab 2

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Task 1:

```
# LAB 1 (HASAAN AHMAD SP22-BSE-017 )

list1 = []
list2 = []

for i in range(5):
    n1=int(input("Enter a Number: "))
    list1.append(n1)

for i in range(5):
    n2=int(input("Enter a Number:"))
    list2.append(n2)

for i in range(5):
    list1.append(list2[i])

list1.sort()
print(list1)
```

Output:

```
PS C:\Users\Administrator\Desktop\Lab 2> python -u "c:\Users\Administrator\Desktop\Lab 2\Lab1.py"
Enter a Number: 1
Enter a Number: 2
Enter a Number: 3
Enter a Number: 43
Enter a Number: 43
Enter a Number:5
Enter a Number:56
Enter a Number:657
Enter a Number:675
Enter a Number:44
[1, 2, 3, 5, 43, 43, 44, 56, 657, 675]
```

Task 2:

```
# LAB 2 (HASAAN AHMAD SP22-BSE-017 )
list1 = []
list2 = []

print("Enter values for List 1:")
for i in range(5):
    n1 = int(input("Enter a Number: "))
    list1.append(n1)
```

```
print("Enter values for List 2:")
for i in range(5):
    n2 = int(input("Enter a Number: "))
    list2.append(n2)

merged_list = list1 + list2

merged_list.sort()
print("Merged and sorted list:", merged_list)

smallest = min(merged_list)
largest = max(merged_list)

print("Smallest element:", smallest)
print("Largest element:", largest)
```

Output:

```
Enter values for List 1:
Enter a Number: 32
Enter a Number: 435
Enter a Number: 45
Enter a Number: 4213
Enter a Number: 4
Enter values for List 2:
Enter a Number: 43
Enter a Number: 5
Enter a Number: 5645
Enter a Number: 45
Enter a Number: 3345
Merged and sorted list: [4, 5, 32, 43, 45, 45, 435, 3345, 4213, 5645]
Smallest element: 4
Largest element: 5645
```

Task 3:

```
# LAB 3 (HASAAN AHMAD SP22-BSE-017 )

from math import *
h = 0.001
x_values = [i * h for i in range(int(-pi/h), int(pi/h) + 1)]

def derivative_of_sin(x, h):
    return (sin(x + h) - sin(x)) / h
```

```
for x in x_values:
    derivative = derivative_of_sin(x, h)
    actual_cos = cos(x)
    print(f"At x = {x}, Derivative of sin(x) = {derivative}, Cos(x) =
{actual_cos}")
```

Output:

```
At x = 2.111, Derivative of sin(x) = -0.5147393894838759, Cos(x) = -0.5143106732641902
At x = 2.112, Derivative of sin(x) = -0.5155964786208722, Cos(x) = -0.5151680199137901
At x = 2.113, Derivative of sin(x) = -0.5164530521615252, Cos(x) = -0.5160248513954131
At x = 2.114, Derivative of sin(x) = -0.5173091092490756, Cos(x) = -0.5168811668522276
At x = 2.115, Derivative of sin(x) = -0.5181646490276526, Cos(x) = -0.5177369654279187
At x = 2.116, Derivative of sin(x) = -0.5190196706416073, Cos(x) = -0.5185922462666872
At x = 2.117, Derivative of sin(x) = -0.5198741732358458, Cos(x) = -0.5194470085132527
At x = 2.118, Derivative of sin(x) = -0.5207281559559407, Cos(x) = -0.5203012513128529
At x = 2.119, Derivative of sin(x) = -0.5215816179481303, Cos(x) = -0.5211549738112455
At x = 2.12, Derivative of sin(x) = -0.5224345583584311, Cos(x) = -0.5220081751547073
At x = 2.121, Derivative of sin(x) = -0.5232869763345249, Cos(x) = -0.5228608544900376
At x = 2.122, Derivative of sin(x) = -0.5241388710235384, Cos(x) = -0.5237130109645569
At x = 2.123, Derivative of sin(x) = -0.5249902415737084, Cos(x) = -0.5245646437261092
At x = 2.124, Derivative of sin(x) = -0.525841087133716, Cos(x) = -0.5254157519230612
At x = 2.125, Derivative of sin(x) = -0.5266914068526862, Cos(x) = -0.5262663347043051
At x = 2.126, Derivative of sin(x) = -0.5275411998802992, Cos(x) = -0.527116391219258
At x = 2.1270000000000002, Derivative of sin(x) = -0.5283904653666793, Cos(x) = -0.5279659206178641
At x = 2.128, Derivative of sin(x) = -0.5292392024627279, Cos(x) = -0.5288149220505931
At x = 2.129, Derivative of sin(x) = -0.5300874103195685, Cos(x) = -0.5296633946684441
At x = 2.13, Derivative of sin(x) = -0.5309350880891017, Cos(x) = -0.5305113376229448
At x = 2.1310000000000002, Derivative of sin(x) = -0.5317822349235612, Cos(x) = -0.5313587500661523
At x = 2.132, Derivative of sin(x) = -0.5326288499757359, Cos(x) = -0.5322056311506536
At x = 2.133, Derivative of sin(x) = -0.5334749323993027, Cos(x) = -0.5330519800295681
At x = 2.134, Derivative of sin(x) = -0.5343204813478275, Cos(x) = -0.5338977958565471
At x = 2.1350000000000002, Derivative of sin(x) = -0.5351654959759866, Cos(x) = -0.534743077785775
At x = 2.136, Derivative of sin(x) = -0.5360099754385672, Cos(x) = -0.5355878249719694
At x = 2.137, Derivative of sin(x) = -0.5368539188913557, Cos(x) = -0.5364320365703834
At x = 2.138, Derivative of sin(x) = -0.5376973254902495, Cos(x) = -0.5372757117368056
At x = 2.1390000000000002, Derivative of sin(x) = -0.5385401943918122, Cos(x) = -0.5381188496275611
At x = 2.14, Derivative of sin(x) = -0.5393825247532735, Cos(x) = -0.5389614493995115
At x = 2.141, Derivative of sin(x) = -0.5402243157321962, Cos(x) = -0.5398035102100575
At x = 2.142, Derivative of sin(x) = -0.5410655664869202, Cos(x) = -0.5406450312171381
```

```
At x = 3.111, Derivative of sin(x) = -0.9995472086198955, Cos(x) = -0.9995320812690446
At x = 3.112, Derivative of sin(x) = -0.9995767969520376, Cos(x) = -0.9995621693797634
At x = 3.113, Derivative of sin(x) = -0.9996053857074666, Cos(x) = -0.999591257928396
At x = 3.114, Derivative of sin(x) = -0.9996329748575907, Cos(x) = -0.9996193468858541
At x = 3.115, Derivative of sin(x) = -0.9996595643748212, Cos(x) = -0.9996464362240485
At x = 3.116, Derivative of sin(x) = -0.9996851542325782, Cos(x) = -0.9996725259158901
At x = 3.117, Derivative of sin(x) = -0.9997097444052576, Cos(x) = -0.9996976159352889
At x = 3.118, Derivative of sin(x) = -0.9997333348682815, Cos(x) = -0.9997217062571552
At x = 3.119, Derivative of sin(x) = -0.9997559255980476, Cos(x) = -0.9997447968573986
At x = 3.12, Derivative of sin(x) = -0.9997775165719764, Cos(x) = -0.9997668877129283
At x = 3.121, Derivative of sin(x) = -0.9997981077684674, Cos(x) = -0.9997879788016538
At x = 3.122, Derivative of sin(x) = -0.9998176991669396, Cos(x) = -0.9998080701024837
At x = 3.123, Derivative of sin(x) = -0.9998362907477909, Cos(x) = -0.9998271615953268
At x = 3.124, Derivative of sin(x) = -0.9998538824924352, Cos(x) = -0.9998452532610916
At x = 3.125, Derivative of sin(x) = -0.999870474383286, Cos(x) = -0.9998623450816866
At x = 3.126, Derivative of sin(x) = -0.9998860664037386, Cos(x) = -0.9998784370400198
At x = 3.1270000000000002, Derivative of sin(x) = -0.9999006585382115, Cos(x) = -0.9998935291199992
At x = 3.128, Derivative of sin(x) = -0.9999142507721107, Cos(x) = -0.999907613065328
At x = 3.129, Derivative of sin(x) = -0.9999268430918393, Cos(x) = -0.9999207135855285
At x = 3.13, Derivative of sin(x) = -0.9999384354848084, Cos(x) = -0.9999328059438939
At x = 3.1310000000000002, Derivative of sin(x) = -0.9999490279394285, Cos(x) = -0.9999438983695367
At x = 3.132, Derivative of sin(x) = -0.9999586204451002, Cos(x) = -0.9999539908513644
At x = 3.133, Derivative of sin(x) = -0.9999672129922367, Cos(x) = -0.9999630833792846
At x = 3.134, Derivative of sin(x) = -0.9999748055722442, Cos(x) = -0.9999711759442048
At x = 3.1350000000000002, Derivative of sin(x) = -0.9999813981775278, Cos(x) = -0.9999782685380324
At x = 3.136, Derivative of sin(x) = -0.9999869908014977, Cos(x) = -0.9999843611536747
At x = 3.137, Derivative of sin(x) = -0.9999915834385592, Cos(x) = -0.9999894537850392
At x = 3.138, Derivative of sin(x) = -0.9999951760841213, Cos(x) = -0.9999935464270333
At x = 3.1390000000000002, Derivative of sin(x) = -0.9999977687345906, Cos(x) = -0.9999966390755644
At x = 3.14, Derivative of sin(x) = -0.9999993613873743, Cos(x) = -0.9999987317275395
At x = 3.141, Derivative of sin(x) = -0.99999995404088, Cos(x) = -0.9999998243808664
```

Task 4:

```python
# LAB 4 (HASAAN AHMAD SP22-BSE-017 )
birthday_dict = {

    "Hasaan Ahmad": "03/14/2002",
    "Mohammad": "01/17/2010",
    "Ali": "12/10/2003"
}

print("Welcome to the birthday dictionary. We know the birthdays of:")
for name in birthday_dict:
    print(name)


name = input("Who's birthday do you want to look up?\n")

if name in birthday_dict:
    birthday = birthday_dict[name]
    print(f"{name}'s birthday is {birthday}.")
else:
```

```
    print("Sorry, we don't have birthday information for that person.")
```

Output:

```
Welcome to the birthday dictionary. We know the birthdays of:
Hasaan Ahmad
Mohammad
Ali
Who's birthday do you want to look up?
Ali
Ali's birthday is 12/10/2003.
```

Task 5:

```python
# LAB 5 (HASAAN AHMAD SP22-BSE-017 )
sample_dict = {
    "name": "Hasaan",
    "age": 21,
    "salary": 12000,
    "city": "Islamabad"
}

keys = ["name", "salary"]

new_dict = {key: sample_dict[key] for key in keys}

print(new_dict)
```

Output:

```
PS C:\Users\Administrator\Desktop\Lab 2> python
{'name': 'Hasaan', 'salary': 12000}
```