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Activity 1: Create two lists based on the user values. Merge both the lists and display in sorted order.

```
myList1=[]
for i in range(5):
  val=input("Enter values of first List:")
  n=int(val)
  myList1.append(n)
  print(myList1)
myList2=[]
for i in range(5):
  val=input("Enter value of 2nd List")
  n=int(val)
  myList2.append(n)
  print(myList2)
myList3=[]
myList3=myList1+myList2
myList3.sort()
print(myList3)
```

```
    Enter values of first List:1
    [1]
    Enter values of first List:2
    [1, 2]
    Enter values of first List:3
    [1, 2, 3]
    Enter values of first List:4
    [1, 2, 3, 4]
    Enter values of first List:5
    [1, 2, 3, 4, 5]
    Enter value of 2nd List6
    [6]
    Enter value of 2nd List7
    [6, 7]
    Enter value of 2nd List8
    [6, 7, 8]
    Enter value of 2nd List9
    [6, 7, 8, 9]
    Enter value of 2nd List10
    [6, 7, 8, 9, 10]
    [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

Activity 2: Repeat the above activity to find the smallest and largest element of the list. (Suppose all the elements are integer values)

```
myList1=[]
for i in range(5):
  val=input("Enter values of first List:")
  n=int(val)
  myList1.append(n)
  print(myList1)
myList2=[]
for i in range(5):
  val=input("Enter value of 2nd List")
```

```
    n=int(val)
    myList2.append(n)
    print(myList2)
    myList3=myList1+myList2
    myList3.sort()
small=min(myList3)
large=max(myList3)
print("Small Number is:",small)
print("Large Number is:",large)
```

```
        Enter values of first List:1
        [1]
        Enter values of first List:2
        [1, 2]
        Enter values of first List:3
        [1, 2, 3]
        Enter values of first List:4
        [1, 2, 3, 4]
        Enter values of first List:5
        [1, 2, 3, 4, 5]
        Enter value of 2nd List6
        [6]
        Enter value of 2nd List7
        [6, 7]
        Enter value of 2nd List8
        [6, 7, 8]
        Enter value of 2nd List9
        [6, 7, 8, 9]
        Enter value of 2nd List10
        [6, 7, 8, 9, 10]
        Small Number is: 1
        Large Number is: 10
```

The derivate of a function f(x) is a measurement of how quickly the function f changes with respect to change in its domain x. This measurement can be approximated by the following relation,

d/dx f(x) =f(x+h)-f(x)/h

Where h represents a small increment in x. You have to prove the following relation

d/dx(sinx)=(cosx) Imagine x being a list that goes from −pi to pi with an increment of 0.001. You can approximate the derivative by using the following approximation,

d/dx(sinx)= sin(x+h)-sin(x)/h

In your case, assume h = 0.001. That is at each point in x, compute the right hand side of above equation and compare whether the output value is equivalent to cos(x). Also print the corresponding values of

d/dx(sinx) and cos(x) for every point. Type "from math import *" at the start of your program to use predefined values of pi, and sin and cos functions. What happens if you increase the interval h from 0.001 to 0.01 and then to 0.1

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

for i in range(len(x)):
    num = sin(x[i]+h) - sin(x[i])
    deriv = num / h
    true_deriv = cos(x[i])
    print(f"x = {x[i]:.3f}: Approx. Deriv. = {deriv:.3f}, True Deriv. = {true_deriv:.3f}")

    Streaming output truncated to the last 5000 lines.
    x = -1.858: Approx. Deriv. = -0.283, True Deriv. = -0.283
    x = -1.857: Approx. Deriv. = -0.282, True Deriv. = -0.282
    x = -1.856: Approx. Deriv. = -0.281, True Deriv. = -0.281
    x = -1.855: Approx. Deriv. = -0.280, True Deriv. = -0.280
    x = -1.854: Approx. Deriv. = -0.279, True Deriv. = -0.279
```

```
x = -1.853: Approx. Deriv. = -0.278, True Deriv. = -0.278
x = -1.852: Approx. Deriv. = -0.277, True Deriv. = -0.278
x = -1.851: Approx. Deriv. = -0.276, True Deriv. = -0.277
x = -1.850: Approx. Deriv. = -0.275, True Deriv. = -0.276
x = -1.849: Approx. Deriv. = -0.274, True Deriv. = -0.275
x = -1.848: Approx. Deriv. = -0.273, True Deriv. = -0.274
x = -1.847: Approx. Deriv. = -0.272, True Deriv. = -0.273
x = -1.846: Approx. Deriv. = -0.271, True Deriv. = -0.272
x = -1.845: Approx. Deriv. = -0.270, True Deriv. = -0.271
x = -1.844: Approx. Deriv. = -0.269, True Deriv. = -0.270
x = -1.843: Approx. Deriv. = -0.268, True Deriv. = -0.269
x = -1.842: Approx. Deriv. = -0.267, True Deriv. = -0.268
x = -1.841: Approx. Deriv. = -0.266, True Deriv. = -0.267
x = -1.840: Approx. Deriv. = -0.265, True Deriv. = -0.266
x = -1.839: Approx. Deriv. = -0.265, True Deriv. = -0.265
x = -1.838: Approx. Deriv. = -0.264, True Deriv. = -0.264
x = -1.837: Approx. Deriv. = -0.263, True Deriv. = -0.263
x = -1.836: Approx. Deriv. = -0.262, True Deriv. = -0.262
x = -1.835: Approx. Deriv. = -0.261, True Deriv. = -0.261
x = -1.834: Approx. Deriv. = -0.260, True Deriv. = -0.260
x = -1.833: Approx. Deriv. = -0.259, True Deriv. = -0.259
x = -1.832: Approx. Deriv. = -0.258, True Deriv. = -0.258
x = -1.831: Approx. Deriv. = -0.257, True Deriv. = -0.257
x = -1.830: Approx. Deriv. = -0.256, True Deriv. = -0.256
x = -1.829: Approx. Deriv. = -0.255, True Deriv. = -0.255
x = -1.828: Approx. Deriv. = -0.254, True Deriv. = -0.254
x = -1.827: Approx. Deriv. = -0.253, True Deriv. = -0.253
x = -1.826: Approx. Deriv. = -0.252, True Deriv. = -0.252
x = -1.825: Approx. Deriv. = -0.251, True Deriv. = -0.251
x = -1.824: Approx. Deriv. = -0.250, True Deriv. = -0.251
x = -1.823: Approx. Deriv. = -0.249, True Deriv. = -0.250
x = -1.822: Approx. Deriv. = -0.248, True Deriv. = -0.249
x = -1.821: Approx. Deriv. = -0.247, True Deriv. = -0.248
x = -1.820: Approx. Deriv. = -0.246, True Deriv. = -0.247
x = -1.819: Approx. Deriv. = -0.245, True Deriv. = -0.246
x = -1.818: Approx. Deriv. = -0.244, True Deriv. = -0.245
x = -1.817: Approx. Deriv. = -0.243, True Deriv. = -0.244
x = -1.816: Approx. Deriv. = -0.242, True Deriv. = -0.243
x = -1.815: Approx. Deriv. = -0.241, True Deriv. = -0.242
x = -1.814: Approx. Deriv. = -0.240, True Deriv. = -0.241
x = -1.813: Approx. Deriv. = -0.239, True Deriv. = -0.240
x = -1.812: Approx. Deriv. = -0.238, True Deriv. = -0.239
x = -1.811: Approx. Deriv. = -0.237, True Deriv. = -0.238
x = -1.810: Approx. Deriv. = -0.236, True Deriv. = -0.237
x = -1.809: Approx. Deriv. = -0.235, True Deriv. = -0.236
x = -1.808: Approx. Deriv. = -0.234, True Deriv. = -0.235
x = -1.807: Approx. Deriv. = -0.234, True Deriv. = -0.234
x = -1.806: Approx. Deriv. = -0.233, True Deriv. = -0.233
x = -1.805: Approx. Deriv. = -0.232, True Deriv. = -0.232
x = -1.804: Approx. Deriv. = -0.231, True Deriv. = -0.231
x = -1.803: Approx. Deriv. = -0.230, True Deriv. = -0.230
```