```
"""
The purpose of this program is to perform an insertion sort.

This program will first generate a list of 100 random numbers
between 0 and 200.  This list will be sorted by the insertion
sort function

The program iterates over each position in the integer array,
comparing each value to the positions before them and inserting
the value into the proper position in a least to greatest order

"""
import random

class InsertSort():

    def __init__(self):

        #Instantiate the random list
        ints = self.irand(100, 200)

        #Print the unsorted list
        print("\n")
        print("Unsorted list: " + "\n")
        print(ints)
        print("\n")

        #Print the sorted list
        print("Sorted list: " + "\n")
        print(self.insSort(ints))

    #Sort the list using an insertion sort
    def insSort(self, nums):

        #Compare the positions in the array
        for i in range(1, len(nums)):

            #The value to be compared
            currentvalue = nums[i]

            #Assign the iterator to a new variable to avoid index errors
            position = i

            #Position must be greater than zero so the index can't be -1
            while position > 0 and nums[position - 1] > currentvalue:

                #Assign the value to a new position
                nums[position] = nums[position - 1]
                position = position - 1

            #Assign the value to a new position
            nums[position] = currentvalue

        #Return the sorted array
```

```
55            return nums
56
57        #The irand function from project 5
58        def irand(self, n, m):
59            b = list(range(n))
60            b = random.sample(range(m), n)
61            return b
62
63    I = InsertSort()
```

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$ python project_6.py


Unsorted list:

[112, 162, 60, 32, 118, 187, 184, 188, 126, 1, 169, 123, 90, 101, 15, 114, 108,
23, 86, 73, 53, 46, 69, 138, 152, 91, 35, 155, 175, 164, 88, 183, 22, 4, 24, 111
, 85, 83, 11, 70, 116, 37, 117, 119, 97, 3, 130, 191, 156, 151, 77, 182, 145, 19
2, 51, 165, 136, 172, 75, 93, 74, 159, 45, 33, 199, 6, 18, 176, 127, 194, 154, 4
7, 27, 153, 173, 78, 62, 121, 94, 186, 26, 79, 174, 17, 76, 115, 84, 34, 7, 44,
8, 10, 170, 180, 54, 50, 163, 190, 120, 150]


Sorted list:

[1, 3, 4, 6, 7, 8, 10, 11, 15, 17, 18, 22, 23, 24, 26, 27, 32, 33, 34, 35, 37, 4
4, 45, 46, 47, 50, 51, 53, 54, 60, 62, 69, 70, 73, 74, 75, 76, 77, 78, 79, 83, 8
4, 85, 86, 88, 90, 91, 93, 94, 97, 101, 108, 111, 112, 114, 115, 116, 117, 118,
119, 120, 121, 123, 126, 127, 130, 136, 138, 145, 150, 151, 152, 153, 154, 155,
156, 159, 162, 163, 164, 165, 169, 170, 172, 173, 174, 175, 176, 180, 182, 183,
184, 186, 187, 188, 190, 191, 192, 194, 199]

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$
```