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//DSL Lab 04 Sorting



#input function
def in_percentage():
    n =int(input("How many students attended for exam: "))
    percentage_lis =[]
    i=0
    per = 100

    if(n>=5):
        while(i<n):
            per = float(input("Enter percentage for "+str(i+1)+"/"+str(n)+":
"))
            if(0<=per<=100):
                percentage_lis.append(per)
                i = i + 1
            else:
                print("Enter valid value for percentage!")
    else:
          print("Enter minimum 5 percentages!")
    #print(percentage_lis)
    return percentage_lis


#insertion sort

def insertion_sort(percentage_lis):

     iteration = 0
     #print("Before: ", percentage_lis)
     n = len(percentage_lis)
     for  i in range(n):
        val = percentage_lis[i]
        j = i-1
        while j >= 0 and val < percentage_lis[j] :
                percentage_lis[j + 1] = percentage_lis[j]
                j -= 1

        iteration = iteration + 1
        percentage_lis[j + 1] = val

        print("Iteration",iteration,".",percentage_lis)



     print("Number of iteration: ",iteration)
     return percentage_lis

#shell sort
def shell_sort(percentage_lis):

    iteration = 0
    #print("Before: ", pre_list)
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    n = len(percentage_lis)
    gap = n//2
    while gap >= 1:
        for i in range(gap,n):
            term = percentage_lis[i]
            k = i - gap
            while percentage_lis[k] > term and k>=0:
                percentage_lis[k+gap] = percentage_lis[k]
                percentage_lis[k] = percentage_lis[k+gap]
                k -= gap


            percentage_lis[k+gap] = term
        iteration = iteration + 1
        print("Iteration",iteration,".",percentage_lis)


        gap = gap //2
    print("Number of iteration: ",iteration)
    return percentage_lis

#top percentages
def top_percentage(percentage_lis):
    percentage_lis = sorted(percentage_lis)
    n = len(percentage_lis)
    if(n<5):
        print("Number of percentages are less than 5!")
        # print("Top percentages are: ")
        # for i in range(1,n+1):
        #     print(str(i)+". "+str(percentage_lis[-i]))
    else:
        print("Top 5 percentages are: ")
        for i in range(1,6):
            print(str(i)+". "+str(percentage_lis[-i]))


#main function
percentage_lis = in_percentage()
pre_list = percentage_lis.copy()
x = len(percentage_lis)
print()
otp = 24
if(x>=5):
    while(otp != 0):
        print("\n-- Menu --")
        print("1. Insertion Sort \n2. Shell Sort \n3. Top 5 percentages")
        otp = int(input("Enter valid option for operation (0 to exit): "))
        if(otp==1):
            print("Before: ", pre_list)
            print("After: ",insertion_sort(percentage_lis))
        elif(otp==2):
            print("Before: ",pre_list)
            print("After: ",shell_sort(pre_list))
        elif(otp==3):
            top_percentage(percentage_lis)
        else:
            print("Program ended successfully!")
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            break
            exit()
else:
    print("Rerun the code!")
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