

```

import timeit
from random import shuffle

import matplotlib.pyplot as plt

def geraListaInvertida(tam):
    lista = list(range(1, tam + 1))
    return lista[::-1]

def geraLista(tam):
    lista = list(range(1, tam + 1))
    shuffle(lista)
    return lista

def desenhaGrafico(x, y, y2, xl="Entradas", yl="Saídas", z='Tempo'):
    fig = plt.figure(figsize=(10, 8))
    ax = fig.add_subplot(111)
    ax.plot(x, y, label="Random(Caso médio) - {}".format(z))
    ax.plot(x, y2, label="Decrescente(Pior caso) - {}".format(z))
    ax.legend(bbox_to_anchor=(1, 1), bbox_transform=plt.gcf().transFigure)
    plt.ylabel(yl)
    plt.xlabel(xl)
    plt.savefig(z+".png")

def insertion_sort(alist):
    iterations = 0
    for index in range(1, len(alist)):

        currentvalue = alist[index]
        position = index

        while position > 0 and alist[position - 1] > currentvalue:
            alist[position] = alist[position - 1]
            position = position - 1
            iterations += 1

        alist[position] = currentvalue
    return iterations

def timeit_func(data):
    func, x = data

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```
    return (timeit.timeit("{}  
({})".format(func, x), setup="from __main__ import {}".format(func), number=1))
```

```
if __name__ == '__main__':
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```
    z = [1000, 10000, 30000, 60000]
```

```
    x = []
```

```
    x2 = []
```

```
    for i in z:
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        x.append(geraLista(int(i)))
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```
        x2.append(geraListaInvertida(int(i)))
```

```
    y = []
```

```
    y2 = []
```

```
    for i in range(len(x)):
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```
        y.append(  
            timeit.timeit("insertion_sort{}".format(x[i]), setup="from __main__ impo
```

```
rt insertion_sort", number=1))
```

```
        y2.append(  
            timeit.timeit("insertion_sort{}".format(x2[i]), setup="from __main__ imp
```

```
ort insertion_sort", number=1))
```

```
    desenhaGrafico(z, y, y2)
```