

## Insertion Sort and Selection Sort

```
#-----
def InsertionSort( lst ) :

    # Sort the list 'lst' into ascending order, using Insertion Sort

    for i in range( len( lst ) ) :

        # with the items in positions 0 to i - 1 already in sorted order,
        # put item lst[ i ] into its sorted position relative to these items
        e = lst[ i ]
        j = i
        while j > 0 and e < lst[ j - 1 ] :
            lst[ j ] = lst[ j - 1 ]
            j -= 1
        lst[ j ] = e

    print( i, ":", lst ) # for demonstration purposes only
```

#-----

#-----

```
>>> L1 = [ 5, 8, 2, 9, 7, 3 ]
```

```
>>> InsertionSort( L1 )
```

```
0 : [5, 8, 2, 9, 7, 3]
1 : [5, 8, 2, 9, 7, 3]
2 : [2, 5, 8, 9, 7, 3]
3 : [2, 5, 8, 9, 7, 3]
4 : [2, 5, 7, 8, 9, 3]
5 : [2, 3, 5, 7, 8, 9]
```

```
>>> L1
[2, 3, 5, 7, 8, 9]
```

```
>>> L2 = [ "one", "fat", "pig", "ate", "the", "big", "pea" ]
```

```
>>> InsertionSort( L2 )
```

```
0 : ['one', 'fat', 'pig', 'ate', 'the', 'big', 'pea']
1 : ['fat', 'one', 'pig', 'ate', 'the', 'big', 'pea']
2 : ['fat', 'one', 'pig', 'ate', 'the', 'big', 'pea']
3 : ['ate', 'fat', 'one', 'pig', 'the', 'big', 'pea']
4 : ['ate', 'fat', 'one', 'pig', 'the', 'big', 'pea']
5 : ['ate', 'big', 'fat', 'one', 'pig', 'the', 'pea']
6 : ['ate', 'big', 'fat', 'one', 'pea', 'pig', 'the']
```

```
>>> L2
['ate', 'big', 'fat', 'one', 'pea', 'pig', 'the']
```

#-----

```
#-----
def SelectionSort( lst ) :

    # Sort the list 'lst' into ascending order, using Selection Sort

    for i in range( len( lst ) ) :

        # put its 'i'th smallest item into position 'i' of 'lst'

        # set 'imin' to the position of the smallest item from lst[ i ] onwards
        imin = i
        for j in range( i + 1, len( lst ) ) :
            if lst[ j ] < lst[ imin ] :
                imin = j

        # swap the values in positions 'i' and 'imin' of 'lst'
        ( lst[ i ], lst[ imin ] ) = ( lst[ imin ], lst[ i ] )

    print( i, ":", lst ) # for demonstration purposes only
```

#-----

#-----

```
>>> L1 = [ 5, 8, 2, 9, 7, 3 ]
```

```
>>> SelectionSort( L1 )
```

```
0 : [2, 8, 5, 9, 7, 3]
1 : [2, 3, 5, 9, 7, 8]
2 : [2, 3, 5, 9, 7, 8]
3 : [2, 3, 5, 7, 9, 8]
4 : [2, 3, 5, 7, 8, 9]
5 : [2, 3, 5, 7, 8, 9]
```

```
>>> L1
[2, 3, 5, 7, 8, 9]
```

```
>>> L2 = [ "one", "fat", "pig", "ate", "the", "big", "pea" ]
```

```
>>> SelectionSort( L2 )
```

```
0 : ['ate', 'fat', 'pig', 'one', 'the', 'big', 'pea']
1 : ['ate', 'big', 'pig', 'one', 'the', 'fat', 'pea']
2 : ['ate', 'big', 'fat', 'one', 'the', 'pig', 'pea']
3 : ['ate', 'big', 'fat', 'one', 'the', 'pig', 'pea']
4 : ['ate', 'big', 'fat', 'one', 'pea', 'pig', 'the']
5 : ['ate', 'big', 'fat', 'one', 'pea', 'pig', 'the']
6 : ['ate', 'big', 'fat', 'one', 'pea', 'pig', 'the']
```

```
>>> L2
['ate', 'big', 'fat', 'one', 'pea', 'pig', 'the']
```

#-----