Ordenar

swap

```
1 void swap(reunion &r, int i, int j) {
2     pair<senial, hablante> aux = r[i];
3     r[i] = r[j];
4     r[j] = aux;
5 }
```

c_1	1
c_2	1
c_3	1

- $m = |r|$
- $T_{swap}(m) = c_1 + c_2 + c_3$
- $T_{swap}(m) \in O(1)$

sumatoria

```
1  int sumatoria(vector<int> s) {
2      int suma = 0;
3
4      int i = 0;
5      while (i < s.size()) {
6          suma += s[i];
7          i++;
8      }
9
10     return suma;
11 }
```

c'_1	1
c'_2	1
c'_3	n+1
c'_4	n
c'_5	n
c'_6	1

- $n = |s|$
- $T_{sumatoria}(n) = c'_1 + c'_2 + c'_3 * (n+1) + c'_4 * n + c'_5 * n + c'_6$
- $T_{sumatoria}(n) \in O(n)$

tono

```
1 float tono(senial s) {
2     return abs(sumatoria(s)) / s.size();
3 }
```

$c''_1 * n$	1

- $n = |s|$
- $T_{tono}(n) = c''_1 * n$
- $T_{tono}(n) \in O(n)$

insert

```
1 void insert(reunion &r, int i) {
2     int j = i;
3     while (j > 0 && tono(r[j].first) > tono(r[j - 1].first)) {
4         swap(r, j, j - 1);
5         j--;
6     }
7 }
```

c'''_1	1
$c'''_2 * (n+n)$	m+1
c'''_3	m
c'''_4	m

- $m = |r|$
- $T_{insert}(m) = c'''_1 + c'''_2 * 2n * (m+1) + c'''_3 * m + c'''_4 * m$
- $T_{insert}(m) \in O(n * m)$

insertionSort

```
1 void insertionSort(reunion &r) {
2     int i = 0;
3     while (i < r.size()) {
4         insert(r, i);
5         i++;
6     }
7 }
```

c_1''''	1
c_2''''	m+1
$c_3'''' * (n * m)$	m
c_4''''	m

- $m = \|r\|$
- $T_{insertSort}(m) = c_1'''' + c_2'''' * (m+1) + c_3'''' * n * m * m + c_4'''' * m$
- $T_{insertSort}(m) \in O(n * m^2)$

ordenar

```
1 void ordenar(reunion &r, int freq, int prof) {
2     insertionSort(r);
3 }
```

$c_1'''' * (n * m^2)$	1

- $m = \|r\|$
- $T_{ordenar}(m) = c_1'''' * (n * m^2)$
- $T_{ordenar}(m) \in O(n * m^2)$