

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 }
```

$$\left| \begin{array}{c} c_1 \\ c_2 \\ c_3 \end{array} \right| \begin{array}{c} 1 \\ 1 \\ 1 \end{array}$$

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

valorAbsoluto

```
1 int valorAbsoluto(int &n){
2     if(n<0){
3         n = n * (-1);
4     }
5     return n;
6 }
```

$$\left| \begin{array}{c} c'_1 \\ c'_2 \end{array} \right| \begin{array}{c} 1 \\ 1 \end{array}$$

- $T_{valorAbsoluto} = c'_1 + c'_2$
- $T_{valorAbsoluto} \in O(1)$

tono

```
1 float tono(senial s){
2     float sumatoria = 0;
3     for(int i=0; i < s.size(); i++){
4         sumatoria = sumatoria + valorAbsoluto(s[i]);
5     }
6     return sumatoria / s.size();
7 }
```

$$\left| \begin{array}{c} c''_1 \\ c''_2 \\ c''_3 \\ c''_4 \end{array} \right| \begin{array}{c} 1 \\ n+1 \\ n \\ 1 \end{array}$$

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

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 }
```

$$\left| \begin{array}{c} c'''_1 \\ c'''_2 * (n + n) \\ c'''_3 \\ c'''_4 \end{array} \right| \begin{array}{c} 1 \\ m+1 \\ m \\ m \end{array}$$

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

insertionSort

```

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

```

$$\left| \begin{array}{c} c_1'''' \\ c_2'''' \\ c_3''' * (n * m) \\ c_4'''' \end{array} \right| \begin{array}{c} 1 \\ m+1 \\ m \\ m \end{array}$$

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

ordenar

```

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

```

$$\left| c_1'''' * (n * m^2) \right| 1$$

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