

```

void transpose (int **a, int n)
{
    for (int i=0; i<n; i++)
        for (int j=i+1; j<n; j++)
            swap (a[i][j], a[j][i])
}

```

Cost	Freq	Total Cost
Curly Brackets Are Not Part of Cost		
C_1	$n+1$	$C_1(n+1)$
C_2	$n(n+1)/2$	$C_2 n(n+1)/2$
C_3	$n(n-1)/2$	$C_3 n(n-1)/2$
Curly Brackets Are Not Part of Cost		

Transpose swap(a[i][j], a[j][i])

$i=0$
 $j=1$ to $n-1 \rightarrow (n-1)$ times
 $i=1$
 $j=2$ to $n-1 \rightarrow (n-2)$ times
 $i=n-2$
 $j=n-2+1$
 $n-1$ to $n-1 \rightarrow 1$ times
 $i=n-1$
 $j=n-1+1$
 n to $n-1 \rightarrow 0$ times
 1 to $1-1$ were not going anywhere at n

$0 + 1 + \dots + (n-2) + N$
 $= 0 + 1 + \dots + (n-2) + (n-1)$
 $N = (n-1)$
 $\frac{N(N+1)}{2}$
 $\frac{(n-1)(n-1+1)}{2}$
 $\frac{(n-1)n}{2}$

$n-1$ is at itself so its going to be 1.
 were not going anywhere at n

Step: for(int j=i+1; j<n; j++)

if $i=0$
 $j=1$ to $n-1 \rightarrow (n-1)+1$
 $n-1+1 = n$
 if $i=1$
 $j=2$ to $n-1 \rightarrow (n-2)+1$
 $n-2+1 = n-1$
 were 2 away from 0
 $0+1+2 \rightarrow n-2$
 if $i=n-1$
 $j=n-1+1$
 n to $n-1+1 = n$
 n to n 1
 $1+2+\dots+n$
 $\left[\frac{n(n+1)}{2} \right]$

$$T(n)_{\text{transpose}} = C_1(n+1) + C_2 \frac{n(n+1)}{2} + C_3 \frac{n(n-1)}{2}$$

$$C_1 n + C_1 + C_2 \frac{n(n+1)}{2} + C_3 \frac{n(n-1)}{2}$$

$$C_1 n + C_1 + \frac{C_2}{1} \cdot \frac{n(n+1)}{2} + \frac{C_3}{1} \cdot \frac{n(n-1)}{2}$$

$$C_1 n + C_1 + \frac{C_2 n(n+1)}{2} + \frac{C_3 n(n-1)}{2}$$

$$C_1 n + C_1 + \frac{C_2 n^2}{2} + \frac{C_2 n}{2} + \frac{C_3 n^2}{2} - \frac{C_3 n}{2}$$

$$\left(\frac{C_2 n^2}{2} + \frac{C_3 n^2}{2} \right) + \left(\frac{C_2 n}{2} - \frac{C_3 n}{2} + C_1 n \right) + C_1$$

$$T(n)_{\text{transpose}} = n^2 \left(\frac{C_2}{2} + \frac{C_3}{2} \right) + n \left(\frac{C_2}{2} - \frac{C_3}{2} + C_1 \right) + C_1$$

Highest order

$$O(n^2)$$

