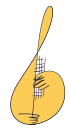
Optimizando acordes en la música popular



Víctor Pérez García
victperez@uv.mx

Universidad Veracruzana, México

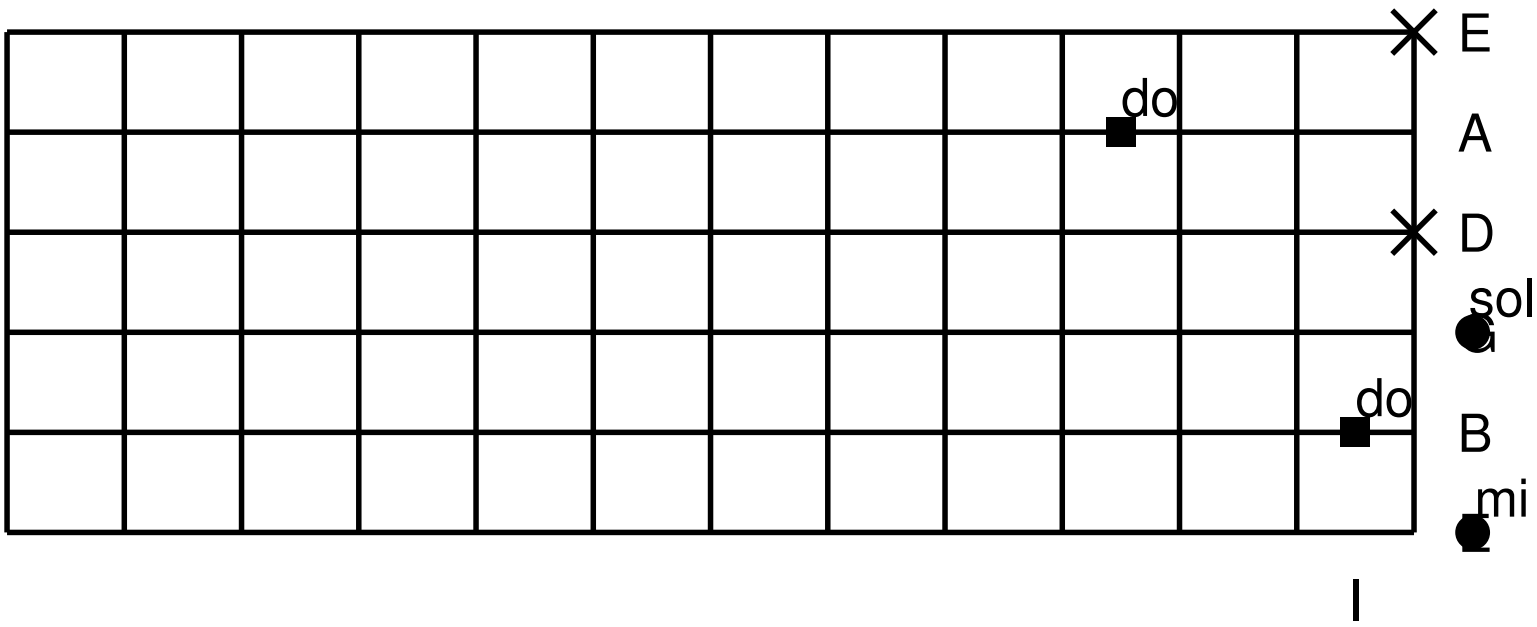
18 de noviembre de 2016

Con la frente marchita
(Joaquín Sabina)

```
Gm7  Cm7               F7             Bb7Maj  Eb7Maj
Sentados en corro merendábamos besos y porros
      Am7(b5)            D7                    Gm7
y las horas pasaban de prisa entre el humo y la risa
                   F
te morías por volver
Ab                    Gm7      F      Eb
   con la frente marchita cantaba Gardel
       Cm7              D7                 Gm7
y entre citas de Borges Evita bailaba con Freud
       Cm7        Am7(b5)    D7        Gm7
ya llovió desde aquel chaparrón hasta hoy

            Bb                                    F
Iba cada domingo a tu puesto del rastro a comprarte
      Ab                Bb               Eb
carricoches de miga de pan soldaditos de lata
      Bb                                  F
con agüita del mar Andaluz quise yo enamorarte
     Ab                   Bb                        Eb
pero tú no querías más amor que el del Río de la Plata

  Cm7                       F7             Bb7Maj  Eb7Maj
Duró la tormenta hasta entrados los años ochenta
        Am7(b5)                D7             Gm7
luego el sol fue secando la ropa de la vieja Europa
                   F
no hay nostalgia peor,
Ab                    Gm7      F      Eb
   que añorar lo que nunca jamás sucedió
       Cm7               D7                 Gm7
mándame una postal de San Telmo, adiós, cuídate
    Cm7     Am7(b5)         D7        Gm7
y sonó entre tú y yo el silbato del tren


            Bb                                    F
Iba cada domingo a tu puesto del rastro a comprarte
     Ab               Bb               Eb
monigotes de miga de pan caballitos de lata
      Bb                                  F
con agüita del mar Andaluz quise yo enamorarte
     Ab                 Bb                         Eb
pero tú no tenías otro amor que el del Río de la Plata
Gm7   Am7(b5)  D7
Gm7   Am7(b5)  D7

  Cm7                     F7               Bb7Maj  Eb7Maj
Aquellas banderas de la patria de la primavera
    Am7(b5)               D7                     Gm7
a decirme que existe el olvido, esta noche han venido
                F
te sentaba tan bien
Ab              Gm7        F        Eb
   esa boina calada al estilo del Che
       Cm7              D7                Gm7
Buenos Aires es como contabas hoy fui a pasear
       Cm7       Am7(b5)  D7      Gm7
y al llegar a la Plaza de Mayo me dio,
       Cm7     Am7(b5)     D7          Gm7
por llorar y me puse a gritar ¿dónde estás?

           Bb                                    F
Y no volví más, a tu puesto del rastro a comprarte
    Ab               Bb                  Eb
corazones de miga de pan, sombreritos de lata
      Bb                                    F
y ya nadie me escribe diciendo no consigo olvidarte
   Ab                  Bb                      Eb
ojalá que estuvieras conmigo en el Río de la Plata
           Bb                                    F
y no volví más, a tu puesto del rastro a comprarte
     Ab                Bb                  Eb
carricoches de miga de pan soldaditos de lata

Gm7   Am7(b5)  D7
Gm7   Am7(b5)  D7 Gm7
```

Notación y terminología: Trastes (trabajaremos del 0 al 11).

do mayor



I

Se representa por *x*3*x*010.

Usaremos acordes con 4 voces

$C, Cm, Cm7, Cm7Maj, Cm2, Cm6, Cm9,$
$C6, C9, C9b, C(69), C7(b5), C7(\#5), C7(b9),$
$C7(9), C7(\#9), C7(69), C7(6\#9), C7(\#11), C7sus4, Csus4,$
$Csus2, C7Maj9, C+7, C+, Cm7(b5), Cdis, C7Maj, C7.$

Y acordes con bajo:

$$C/F, Cm/F, Cm7/F, C7/F.$$

Un total de 29 calidades de acordes diferentes, además cuatro de ellos incluyen bajo adicional. Se considera un total de 396 acordes distintos. Usar hasta tres trastes consecutivos.
Del traste 0 al 11 hay 3030 formas distintas de digitar estos acordes.

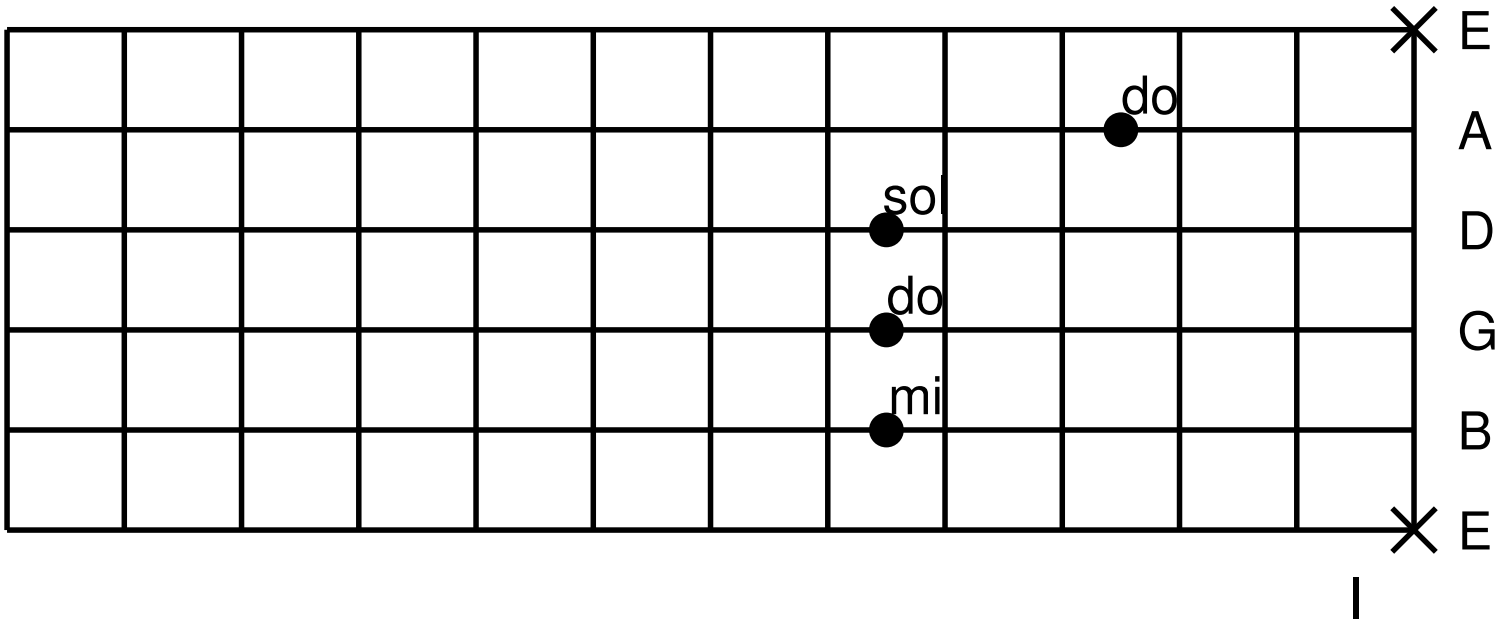
Dado el conjunto de digitaciones $\mathcal{D}$ definimos una métrica $d : \mathcal{D} \times \mathcal{D}$ con las siguientes propiedades:

- Si entre el acorde c_1 y el acorde c_2 solo hay un cambio de un dedo, un traste, la distancia será $d(c_1, c_2) = 1$.
- Subir o bajar un dedo un traste cuesta a lo más 2.
- El diámetro se alcanza en los acordes $0000xx$ y $xx12.12.12.12$.
- Si nos restringimos a los trastes $t_1 < t_2$, el diámetro se alcanza en los acordes $t_1 t_1 t_1 t_1 xx$ y $xx t_2 t_2 t_2 t_2$.

Obtenemos un espacio métrico en $\mathcal{D}$ que mide el esfuerzo de pasar de un acorde a otro.

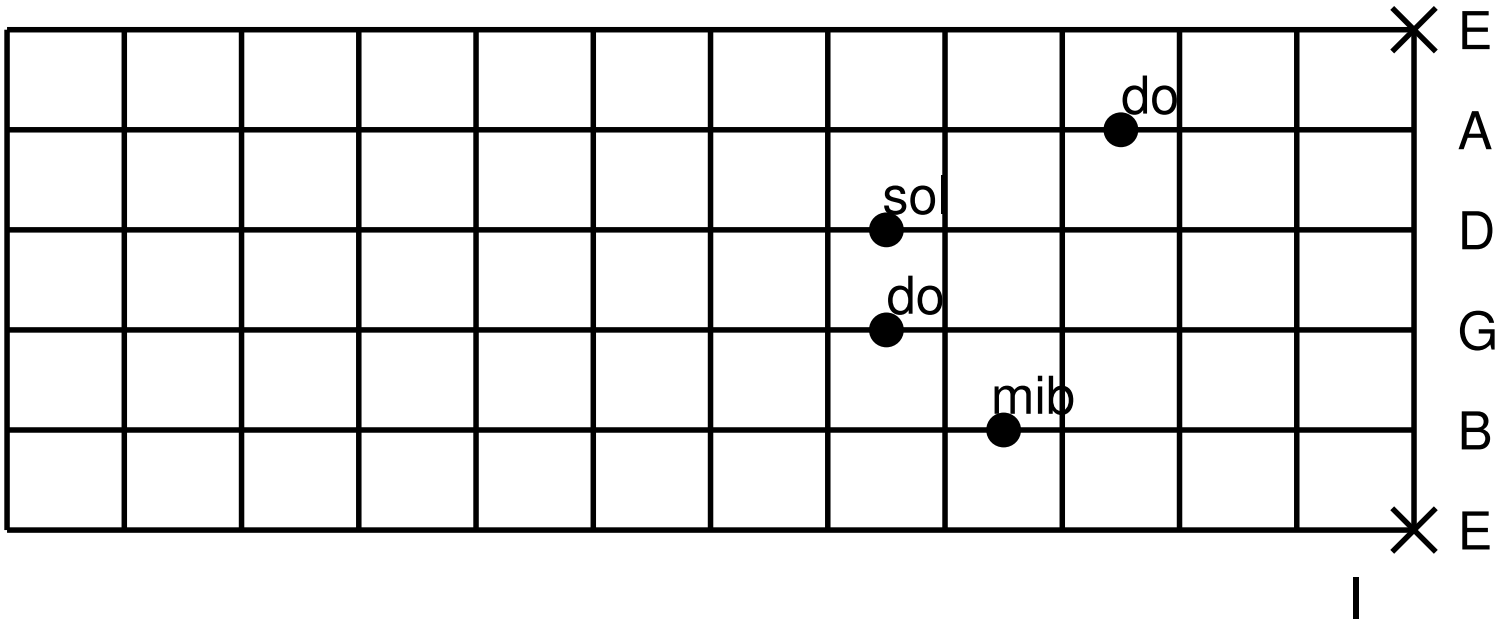
$$d(x3555x, x3554x) = 1.$$

do mayor a do menor



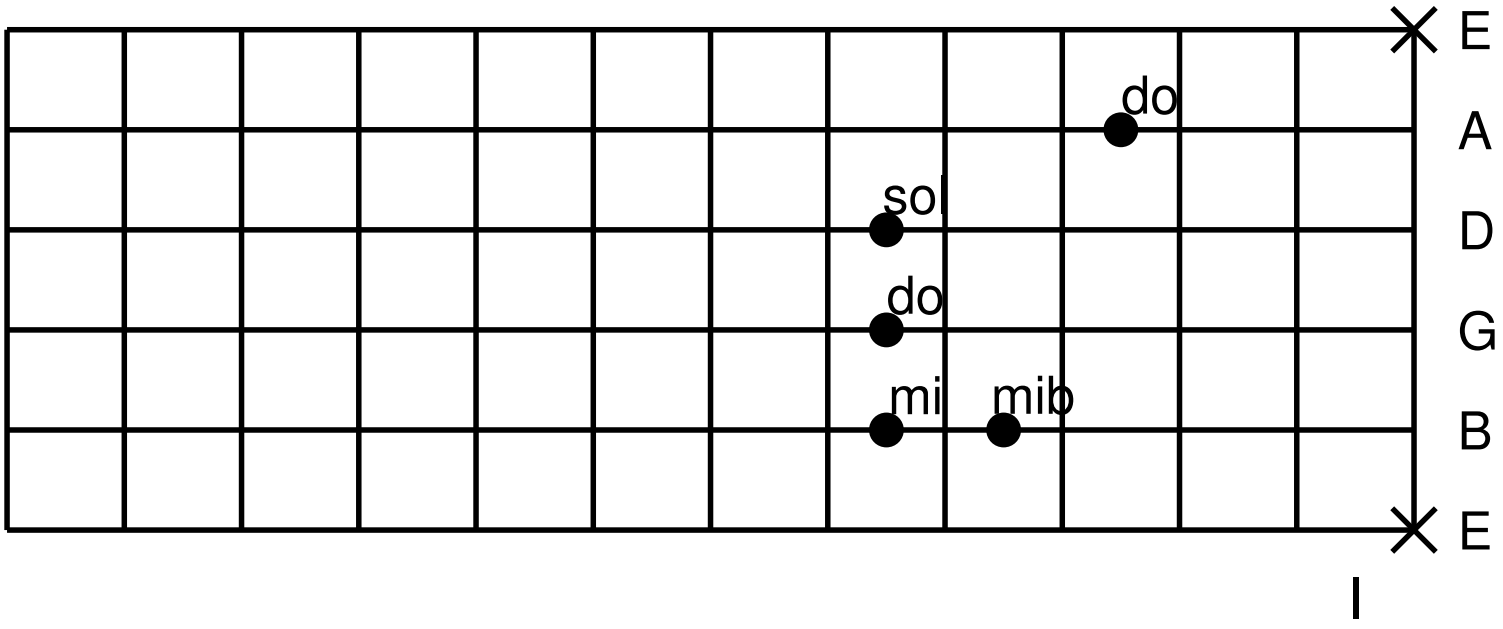
$$d(x3555x, x3554x) = 1.$$

do mayor a do menor



$$d(x3555x, x3554x) = 1.$$

do mayor a do menor



Una canción se puede ver como un producto cartesiano de digitaciones de acordes:

$$\mathcal{S} = \mathcal{A}_1 \times \mathcal{A}_2 \times \ldots \mathcal{A}_n,$$

donde cada elemento de $\mathcal{S}$ es una forma de tocar una secuencia de acordes dada por la canción.
Por ejemplo, nuestra canción se puede ver:

$$\mathcal{S} = Gm7 \times Cm7 \times \cdots \times Gm7,$$

donde *Gm7* son las formas distintas de digitar sol menor con séptima en la guitarra, etc.

La secuencia de 110 acordes de la canción es la siguiente:

$Gm7, Cm7, F7, Bb7M, Eb7M, Am7(b5), D7, Gm7, F, Ab, Gm7,$
$F, Eb, Cm7, D7, Gm7, Cm7, Am7(b5), D7, Gm7, Bb, F,$
$Ab, Bb, Eb, Bb, F, Ab, Bb, Eb, Cm7, F7, Bb7M,$
$Eb7M, Am7(b5), D7, Gm7, F, Ab, Gm7, F, Eb, Cm7, D7,$
$Gm7, Cm7, Am7(b5), D7, Gm7, Bb, F, Ab, Bb, Eb, Bb,$
$F, Ab, Bb, Eb, Gm7, Am7(b5), D7, Gm7, Am7(b5), D7, Cm7,$
$F7, Bb7M, Eb7M, Am7(b5), D7, Gm7, F, Ab, Gm7, F, Eb,$
$Cm7, D7, Gm7, Cm7, Am7(b5), D7, Gm7, Cm7, Am7(b5), D7, Gm7,$
$Bb, F, Ab, Bb, Eb, Bb, F, Ab, Bb, Eb, Bb,$
$F, Ab, Bb, Eb, Gm7, Am7(b5), D7, Gm7, Am7(b5), D7, Gm7.$

$$\mathcal{S} = Gm7 \times Cm7 \times \cdots \times Gm7.$$

Hay

$$\begin{aligned} &144416434077024608081554792821407318115234375000000000000000000000000000000 \\ \approx &1.4 \times 10^{74} \end{aligned}$$

con acordes en posición fundamental.

Vamos a medir la dificultad de tocar cada una de estas versiones. Dado $v = a_1 \times a_2 \times \cdots \times a_n \in \mathcal{S}$, definimos su peso como

$$w(v) = d(a_1, a_2) + d(a_2, a_3) + \cdots + d(a_{n-1}, a_n).$$

El objetivo es hallar la canción de peso mínimo:

$$\min_{v \in \mathcal{S}} w(v).$$

Dado los número grandes, usamos programación dinámica para resolver el problema.

$$\mathcal{S} = Gm7 \times Cm7 \times \cdots \times Gm7.$$

Hay

$$\begin{aligned} &144416434077024608081554792821407318115234375000000000000000000000000000000 \\ \approx &1.4 \times 10^{74} \end{aligned}$$

con acordes en posición fundamental.

Solución, 0-11, fundamental

Gm7 [-1, 10, 8, 10, 8, -1]
Cm7 [8, -1, 8, 8, 8, -1]
F7 [-1, 8, 7, 8, 6, -1]
Bb7M [6, -1, 7, 7, 6, -1]
Eb7M [-1, 6, 8, 7, 8, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
G# [4, -1, 6, 5, 4, -1]
Gm7 [3, -1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
Eb [-1, 6, -1, 0, 4, 6]
Cm7 [-1, 3, 5, 3, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Bb [-1, 1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
G# [4, -1, 6, 5, 4, -1]
Bb [-1, 1, 3, 3, 3, -1]
Eb [-1, 6, -1, 0, 4, 6]
Bb [-1, 1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
G# [4, -1, 6, 5, 4, -1]
Bb [6, -1, 8, 7, 6, -1]
Eb [-1, 6, 8, 8, 8, -1]
Cm7 [8, -1, 8, 8, 8, -1]
F7 [-1, 8, 7, 8, 6, -1]
Bb7M [6, -1, 7, 7, 6, -1]
Eb7M [-1, 6, 8, 7, 8, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]

F [1, -1, 3, 2, 1, -1]
G# [4, -1, 6, 5, 4, -1]
Gm7 [3, -1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
Eb [-1, 6, -1, 0, 4, 6]
Cm7 [-1, 3, 5, 3, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Bb [-1, 1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
G# [4, -1, 6, 5, 4, -1]
Bb [-1, 1, 3, 3, 3, -1]
Eb [-1, 6, -1, 0, 4, 6]
Bb [-1, 1, -1, 3, 3, 1]
F [1, -1, -1, 2, 1, 1]
G# [4, -1, -1, 5, 4, 4]
Bb [6, -1, -1, 7, 6, 6]
Eb [-1, 6, -1, 8, 8, 6]
Gm7 [-1, -1, 5, 7, 6, 6]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Cm7 [-1, 3, 1, 3, 1, -1]
F7 [1, -1, 1, 2, 1, -1]
Bb7M [-1, 1, 3, 2, 3, -1]
Eb7M [-1, -1, 1, 3, 3, 3]
Am7(b5) [-1, 0, -1, 5, 4, 3]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
G# [4, -1, 6, 5, 4, -1]

Gm7 [3, -1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
Eb [-1, 6, -1, 0, 4, 6]
Cm7 [-1, 3, 5, 3, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Bb [-1, 1, 3, 3, 3, -1]
F [1, -1, 3, 2, 1, -1]
G# [4, -1, 6, 5, 4, -1]
Bb [-1, 1, 3, 3, 3, -1]
Eb [-1, 6, -1, 0, 4, 6]
Bb [-1, 1, -1, 3, 3, 1]
F [1, -1, -1, 2, 1, 1]
G# [4, -1, -1, 5, 4, 4]
Bb [6, -1, -1, 7, 6, 6]
Eb [-1, 6, -1, 0, 4, 6]
Bb [-1, 1, -1, 3, 3, 1]
F [1, -1, -1, 2, 1, 1]
G# [4, -1, -1, 5, 4, 4]
Bb [6, -1, -1, 7, 6, 6]
Eb [-1, 6, -1, 8, 8, 6]
Gm7 [-1, -1, 5, 7, 6, 6]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [-1, 5, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]

$$\mathcal{S} = Gm7 \times Cm7 \times \cdots \times Gm7.$$

Hay

$$\begin{aligned} &200651543319980786894881120021522188760493826762439350848921817139239618044202584335777077122826240000000000 \\ \approx &2 \times 10^{109} \end{aligned}$$

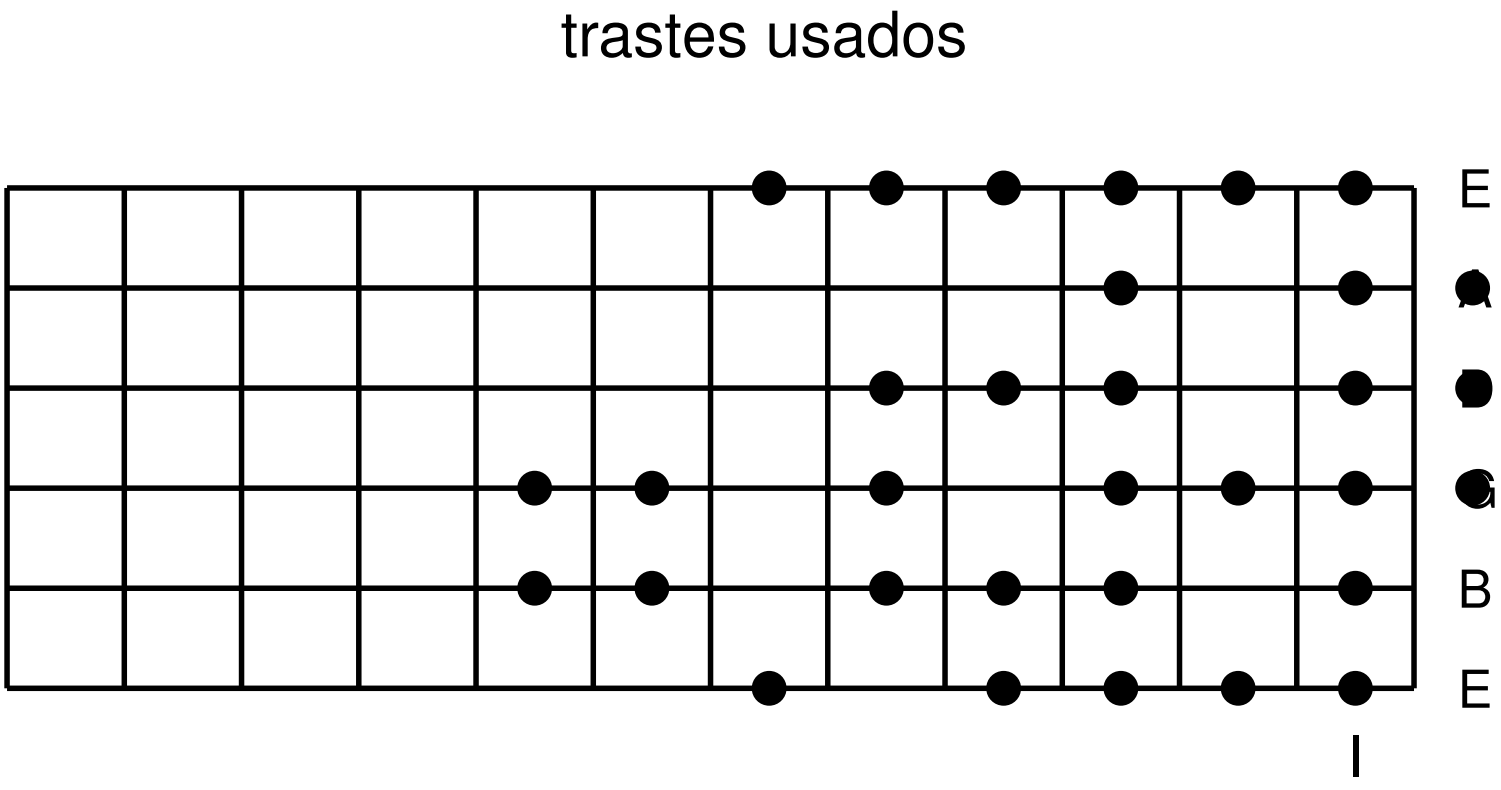
acordes con inversiones.

Solución, 0-11, inversiones

Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
F7 [-1, 3, 3, 2, 4, -1]
Bb7M [-1, 1, 3, 2, 3, -1]
Eb7M [-1, 1, 1, 0, 3, -1]
Am7(b5) [-1, 0, 1, 0, 1, -1]
D7 [2, -1, 0, 2, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 3, 3, 2, 1, -1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, 3, -1, 3, 4, 3]
D7 [-1, 0, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
Am7(b5) [-1, 0, 5, 5, 4, -1]
D7 [-1, 0, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Bb [-1, 1, 3, 3, 3, -1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Bb [1, -1, -1, 3, 3, 1]
F [1, -1, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, 3, -1, 3, 4, 3]
F7 [-1, 3, 3, 2, 4, -1]
Bb7M [-1, 1, 3, 2, 3, -1]
Eb7M [-1, 1, 1, 0, 3, -1]
Am7(b5) [-1, 0, 1, 0, 1, -1]
D7 [2, -1, 0, 2, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]

F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 3, 3, 2, 1, -1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, -1, 1, 3, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Cm7 [-1, -1, 1, 3, 1, 3]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Bb [-1, 1, -1, 3, 3, 1]
F [-1, 3, -1, 2, 1, 1]
G# [4, -1, -1, 5, 4, 4]
Bb [6, -1, -1, 7, 6, 6]
Eb [6, -1, -1, 8, 8, 6]
Bb [6, -1, -1, 7, 6, 6]
F [5, -1, -1, 5, 6, 5]
G# [4, -1, -1, 5, 4, 4]
Bb [6, -1, -1, 7, 6, 6]
Eb [6, -1, -1, 8, 8, 6]
Gm7 [6, -1, 5, 7, 6, -1]
Am7(b5) [5, -1, 5, 5, 4, -1]
D7 [5, -1, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Am7(b5) [-1, 0, 5, 5, 4, -1]
D7 [-1, 0, 4, 5, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
F7 [-1, 3, 3, 2, 4, -1]
Bb7M [-1, 1, 3, 2, 3, -1]
Eb7M [-1, 1, 1, 0, 3, -1]
Am7(b5) [-1, 0, 1, 0, 1, -1]
D7 [2, -1, 0, 2, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]

Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 3, 3, 2, 1, -1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, -1, 1, 3, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Cm7 [-1, -1, 1, 3, 1, 3]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Cm7 [-1, -1, 1, 3, 1, 3]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Bb [-1, 1, -1, 3, 3, 1]
F [-1, 3, -1, 2, 1, 1]
G# [4, -1, -1, 5, 4, 4]
Bb [6, -1, -1, 7, 6, 6]
Eb [6, -1, -1, 8, 8, 6]
Bb [6, -1, -1, 7, 6, 6]
F [5, -1, -1, 5, 6, 5]
G# [4, -1, -1, 5, 4, 4]
Bb [6, -1, -1, 7, 6, 6]
Eb [6, -1, -1, 8, 8, 6]
Bb [6, -1, -1, 7, 6, 6]
F [5, -1, -1, 5, 6, 5]
G# [4, -1, -1, 5, 4, 4]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Gm7 [3, -1, -1, 3, 3, 1]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]


trastes usados
E
B
E
I

$$\mathcal{S} = Gm7 \times Cm7 \times \cdots \times Gm7.$$

Hay

$$\begin{aligned} &53707624969951797854963635085269132687 \\ &58559977277824276889600000000000 \\ \approx\ &5 \times 10^{68}, \end{aligned}$$

acordes con inversiones, del traste 0 al 5.

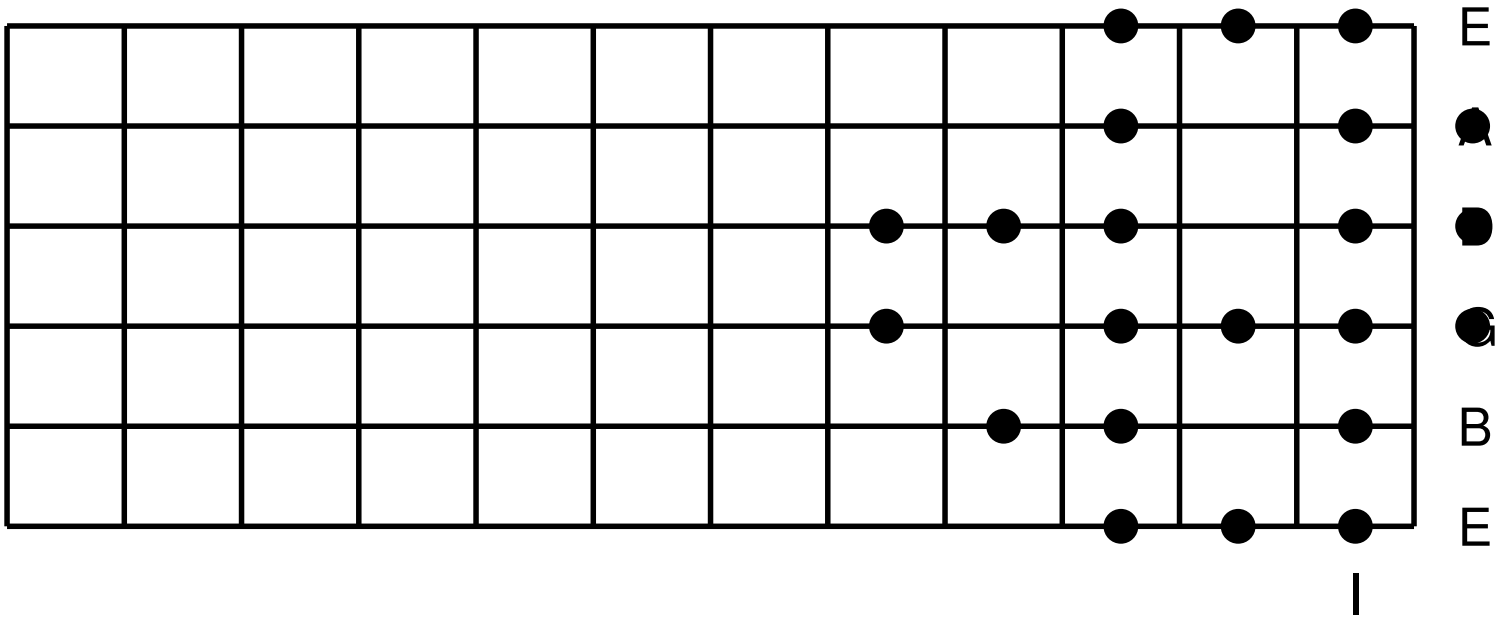
Solución, 0-11, inversiones

Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
F7 [-1, 3, 3, 2, 4, -1]
Bb7M [-1, 1, 3, 2, 3, -1]
Eb7M [-1, 1, 1, 0, 3, -1]
Am7(b5) [-1, 0, 1, 0, 1, -1]
D7 [2, -1, 0, 2, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 3, 3, 2, 1, -1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, 3, -1, 3, 4, 3]
D7 [-1, 0, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
Am7(b5) [-1, 0, 5, 5, 4, -1]
D7 [-1, 0, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Bb [-1, 1, 3, 3, 3, -1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Bb [1, -1, -1, 3, 3, 1]
F [1, -1, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, 3, -1, 3, 4, 3]
F7 [-1, 3, 3, 2, 4, -1]
Bb7M [-1, 1, 3, 2, 3, -1]
Eb7M [-1, 1, 1, 0, 3, -1]
Am7(b5) [-1, 0, 1, 0, 1, -1]
D7 [2, -1, 0, 2, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]

F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 3, 3, 2, 1, -1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, 3, -1, 3, 4, 3]
D7 [-1, 0, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
Am7(b5) [-1, 0, 5, 5, 4, -1]
D7 [-1, 0, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Bb [-1, 1, 3, 3, 3, -1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Bb [1, -1, -1, 3, 3, 1]
F [1, -1, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Gm7 [3, -1, -1, 3, 3, 1]
Am7(b5) [-1, 0, 5, 5, 4, -1]
D7 [-1, 0, 4, 5, 3, -1]
Gm7 [3, -1, 3, 3, 3, -1]
Am7(b5) [-1, 0, 5, 5, 4, -1]
D7 [-1, 0, 4, 5, 3, -1]
Cm7 [-1, 3, 5, 3, 4, -1]
F7 [-1, 3, 3, 2, 4, -1]
Bb7M [-1, 1, 3, 2, 3, -1]
Eb7M [-1, 1, 1, 0, 3, -1]
Am7(b5) [-1, 0, 1, 0, 1, -1]
D7 [2, -1, 0, 2, 1, -1]
Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]

Gm7 [-1, 1, 3, 0, 3, -1]
F [-1, 3, 3, 2, 1, -1]
Eb [3, -1, -1, 3, 4, 3]
Cm7 [-1, -1, 1, 3, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Cm7 [-1, -1, 1, 3, 1, 3]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Cm7 [-1, -1, 1, 3, 1, 3]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Bb [-1, 1, -1, 3, 3, 1]
F [-1, 0, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Bb [1, -1, -1, 3, 3, 1]
F [1, -1, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Bb [1, -1, -1, 3, 3, 1]
F [1, -1, 3, 2, 1, -1]
G# [-1, 3, 1, 1, 1, -1]
Bb [1, -1, -1, 3, 3, 1]
Eb [3, -1, -1, 3, 4, 3]
Gm7 [3, -1, -1, 3, 3, 1]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]
Am7(b5) [-1, -1, 1, 2, 1, 3]
D7 [-1, -1, 0, 2, 1, 2]
Gm7 [-1, 1, -1, 0, 3, 1]

primeros trastes



Gracias