調 (Key)

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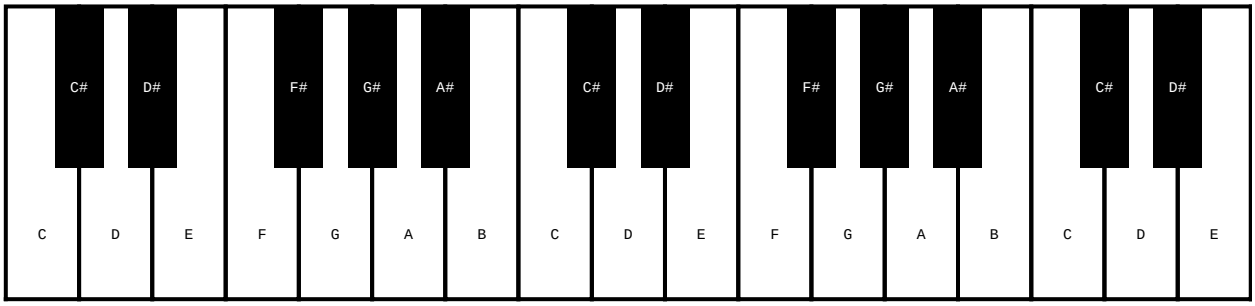
Define Rotate Function



長音階 (major scale)

In[1]:=
```
PrintNoteInterval[WHToneNoteList_] := Module[{},
  (* 音名と全音と半音の関係を表示する関数 *)
  gnotelis =
   Table[{{AbsoluteThickness[2], Line[{{(i - 1) - 1 / 2, -1 / 2}, {(i - 1) + 1 / 2, -1 / 2},
        {(i - 1) + 1 / 2, 1 / 2}, {(i - 1) - 1 / 2, 1 / 2}, {(i - 1) - 1 / 2, -1 / 2}}]},
     Text[StyleForm[WHToneNoteList[[1, i]], FontSize → 14, FontWeight → "Bold"],
      {i - 1, 0}, {0, 0}, {1, 0}]}, {i, 1, Length[WHToneNoteList[[2]]]}];
  gintervallis = Table[Text[StyleForm[WHToneNoteList[[2, i]],
      FontSize → 14, FontWeight → "Bold"], {i - 1 + 1 / 2, 1},
     {0, 0}, {1, 0}], {i, 1, Length[WHToneNoteList[[1]]]}];
  Show[Graphics[{gnotelis, gintervallis}],
   PlotRange → All,
   AspectRatio → Automatic]
 ];


ApplySharp[Note_] := Module[{},
  (* 音名を半音上げる *)
  If[StringTake[Note, -1] == "♭",
   StringTake[Note, {1, StringLength[Note] - 1}],
   Note <> "♯"
  ]
 ];
ApplyFlat[Note_] := Module[{},
  (* 音名を半音下げる *)
  If[StringTake[Note, -1] == "♯",
   StringTake[Note, {1, StringLength[Note] - 1}],
   Note <> "♭"
  ]
 ];

ApplySharpInScale[NoteWHToneList_, n_] := Module[{lis = NoteWHToneList},
  (* 音階リストのn番目の音名を半音上げる *)
  lis = ReplacePart[lis, ApplySharp[lis[[1, n]] ], {1, n}];
  lis = ReplacePart[lis, lis[[2, n - 1]] + 1, {2, n - 1}];
  lis = ReplacePart[lis, lis[[2, n]] - 1, {2, n}];
  lis
 ];
ApplyFlatInScale[NoteWHToneList_, n_] := Module[{lis = NoteWHToneList},
  (* 音階リストのn番目の音名を半音下げる *)
  lis = ReplacePart[lis, ApplyFlat[lis[[1, n]] ], {1, n}];
  lis = ReplacePart[lis, lis[[2, n - 1]] - 1, {2, n - 1}];
  lis = ReplacePart[lis, lis[[2, n]] + 1, {2, n}];
  lis
 ];

NextSharpMajorScale[NoteWHToneList_] := Module[{},
   LisInitial =
    {RotateLeft[NoteWHToneList[[1]], 4], RotateLeft[NoteWHToneList[[2]], 4]};
   Print["**** Initial After RotateLeft[*,4] ****"];
```

```
    PrintNoteInterval[LisInitial];

    Print["**** Modified Major Scale ****"];
    LisModified = LisInitial;
    Print["Key: ", LisModified[[1, 1]], " Major"];

    LisModified = ApplySharpInScale[LisModified, 7];

    PrintNoteInterval[LisModified];

    LisModified];
NextFlatMajorScale[NoteWHToneList_] := Module[{},
    LisInitial =
     {RotateRight[NoteWHToneList[[1]], 4], RotateRight[NoteWHToneList[[2]], 4]};
    Print["**** Initial After RotateRight[*,4] ****"];
    PrintNoteInterval[LisInitial];

    Print["**** Modified Major Scale ****"];
    LisModified = LisInitial;
    Print["Key: ", LisModified[[1, 1]], " Major"];

    LisModified = ApplyFlatInScale[LisModified, 4];

    PrintNoteInterval[LisModified];

    LisModified];
```

Sharp Major

Initial

```
In[8]:= WHToneNoteList = {{"C", "D", "E", "F", "G", "A", "B"}, {2, 2, 1, 2, 2, 2, 1}};
        PrintNoteInterval[WHToneNoteList];
```

2 2 1 2 2 2 1

C	D	E	F	G	A	B

1 times

In[10]:= **lis1 = NextSharpMajorScale[WHToneNoteList]**

```
**** Initial After RotateLeft[*,4] ****
```

2 2 1 2 2 1 2

G	A	B	C	D	E	F

```
**** Modified Major Scale ****

Key: G Major
```

2 2 1 2 2 2 1

G	A	B	C	D	E	F♯

Out[10]= {{G, A, B, C, D, E, F♯}, {2, 2, 1, 2, 2, 2, 1}}

2 times

In[11]:= **lis2 = NextSharpMajorScale[lis1]**

```
**** Initial After RotateLeft[*,4] ****
```

2 2 1 2 2 1 2

D	E	F♯	G	A	B	C

```
**** Modified Major Scale ****

Key: D Major
```

2 2 1 2 2 2 1

D	E	F♯	G	A	B	C♯

Out[11]= {{D, E, F♯, G, A, B, C♯}, {2, 2, 1, 2, 2, 2, 1}}

3 times

In[12]:= **lis3 = NextSharpMajorScale[lis2]**

```
**** Initial After RotateLeft[*,4] ****
```

2 2 1 2 2 1 2

A	B	C♯	D	E	F♯	G

```
**** Modified Major Scale ****

Key: A Major
```

2 2 1 2 2 2 1

A	B	C♯	D	E	F♯	G♯

Out[12]= {{A, B, C♯, D, E, F♯, G♯}, {2, 2, 1, 2, 2, 2, 1}}

4 times

In[13]:= **lis4 = NextSharpMajorScale[lis3]**

```
**** Initial After RotateLeft[*,4] ****
```

2 2 1 2 2 1 2

E	F♯	G♯	A	B	C♯	D

```
**** Modified Major Scale ****

Key: E Major
```

2 2 1 2 2 2 1

E	F♯	G♯	A	B	C♯	D♯

Out[13]= {{E, F♯, G♯, A, B, C♯, D♯}, {2, 2, 1, 2, 2, 2, 1}}

5 times

In[14]:= **lis5 = NextSharpMajorScale[lis4]**

```
**** Initial After RotateLeft[*,4] ****
```

2 2 1 2 2 1 2

B	C♯	D♯	E	F♯	G♯	A

```
**** Modified Major Scale ****

Key: B Major
```

2 2 1 2 2 2 1

B	C♯	D♯	E	F♯	G♯	A♯

Out[14]= {{B, C♯, D♯, E, F♯, G♯, A♯}, {2, 2, 1, 2, 2, 2, 1}}

6 times

In[15]:= **lis6 = NextSharpMajorScale[lis5]**

```
**** Initial After RotateLeft[*,4] ****
```

2 2 1 2 2 1 2

F♯	G♯	A♯	B	C♯	D♯	E

```
**** Modified Major Scale ****

Key: F♯ Major
```

2 2 1 2 2 2 1

F♯	G♯	A♯	B	C♯	D♯	E♯

Out[15]= {{F♯, G♯, A♯, B, C♯, D♯, E♯}, {2, 2, 1, 2, 2, 2, 1}}

7 times

In[16]:= **lis7 = NextSharpMajorScale[lis6]**

```
**** Initial After RotateLeft[*,4] ****
```

2 2 1 2 2 1 2

C♯	D♯	E♯	F♯	G♯	A♯	B

```
**** Modified Major Scale ****

Key: C♯ Major
```

2 2 1 2 2 2 1

C♯	D♯	E♯	F♯	G♯	A♯	B♯

Out[16]= {{C♯, D♯, E♯, F♯, G♯, A♯, B♯}, {2, 2, 1, 2, 2, 2, 1}}

Flat Major

Initial

In[17]:=
```
WHToneNoteList = {{"C", "D", "E", "F", "G", "A", "B"}, {2, 2, 1, 2, 2, 2, 1}};
PrintNoteInterval[WHToneNoteList];
```

2 2 1 2 2 2 1

C	D	E	F	G	A	B

1 times

In[19]:= **lis1 = NextFlatMajorScale[WHToneNoteList]**

```
**** Initial After RotateRight[*,4] ****
```

2 2 2 1 2 2 1

F	G	A	B	C	D	E

```
**** Modified Major Scale ****

Key: F Major
```

2 2 1 2 2 2 1

F	G	A	B♭	C	D	E

Out[19]= {{F, G, A, B♭, C, D, E}, {2, 2, 1, 2, 2, 2, 1}}

2 times

In[20]:= **lis2 = NextFlatMajorScale[lis1]**

```
**** Initial After RotateRight[*,4] ****
```

2 2 2 1 2 2 1

B♭	C	D	E	F	G	A

```
**** Modified Major Scale ****

Key: B♭ Major
```

2 2 1 2 2 2 1

B♭	C	D	E♭	F	G	A

Out[20]= {{B♭, C, D, E♭, F, G, A}, {2, 2, 1, 2, 2, 2, 1}}

3 times

In[21]:= **lis3 = NextFlatMajorScale[lis2]**

```
**** Initial After RotateRight[*,4] ****
```

2 2 2 1 2 2 1

Eb	F	G	A	Bb	C	D

```
**** Modified Major Scale ****

Key: Eb Major
```

2 2 1 2 2 2 1

Eb	F	G	Ab	Bb	C	D

Out[21]= {{Eb, F, G, Ab, Bb, C, D}, {2, 2, 1, 2, 2, 2, 1}}

4 times

In[22]:= **lis4 = NextFlatMajorScale[lis3]**

```
**** Initial After RotateRight[*,4] ****
```

2 2 2 1 2 2 1

Ab	Bb	C	D	Eb	F	G

```
**** Modified Major Scale ****

Key: Ab Major
```

2 2 1 2 2 2 1

Ab	Bb	C	Db	Eb	F	G

Out[22]= {{Ab, Bb, C, Db, Eb, F, G}, {2, 2, 1, 2, 2, 2, 1}}

5 times

In[23]:= **lis5 = NextFlatMajorScale[lis4]**

```
**** Initial After RotateRight[*,4] ****
```

2 2 2 1 2 2 1

Db	Eb	F	G	Ab	Bb	C

```
**** Modified Major Scale ****

Key: Db Major
```

2 2 1 2 2 2 1

Db	Eb	F	Gb	Ab	Bb	C

Out[23]= {{Db, Eb, F, Gb, Ab, Bb, C}, {2, 2, 1, 2, 2, 2, 1}}

6 times

In[24]:= **lis6 = NextFlatMajorScale[lis5]**

```
**** Initial After RotateRight[*,4] ****
```

2 2 2 1 2 2 1

Gb	Ab	Bb	C	Db	Eb	F

```
**** Modified Major Scale ****

Key: Gb Major
```

2 2 1 2 2 2 1

Gb	Ab	Bb	Cb	Db	Eb	F

Out[24]= {{Gb, Ab, Bb, Cb, Db, Eb, F}, {2, 2, 1, 2, 2, 2, 1}}

7 times

In[25]:= **lis7 = NextFlatMajorScale[lis6]**

```
**** Initial After RotateRight[*,4] ****
```

2 2 2 1 2 2 1

Cb	Db	Eb	F	Gb	Ab	Bb

```
**** Modified Major Scale ****

Key: C♭ Major
```

2 2 1 2 2 2 1

Cb	Db	Eb	Fb	Gb	Ab	Bb

Out[25]= {{C♭, D♭, E♭, F♭, G♭, A♭, B♭}, {2, 2, 1, 2, 2, 2, 1}}