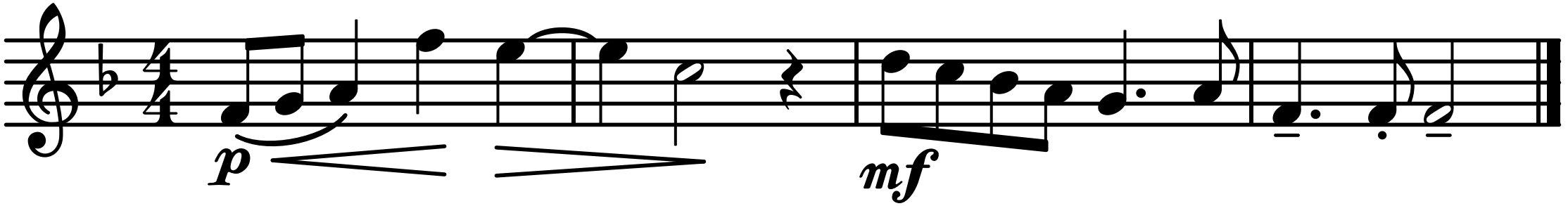
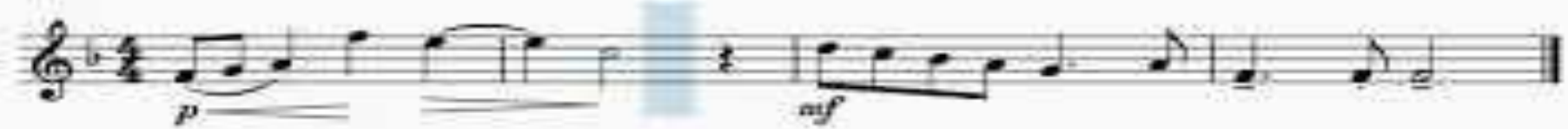
SHEET MUSIC ENGRAVING

Sam Barr

Sheet Music



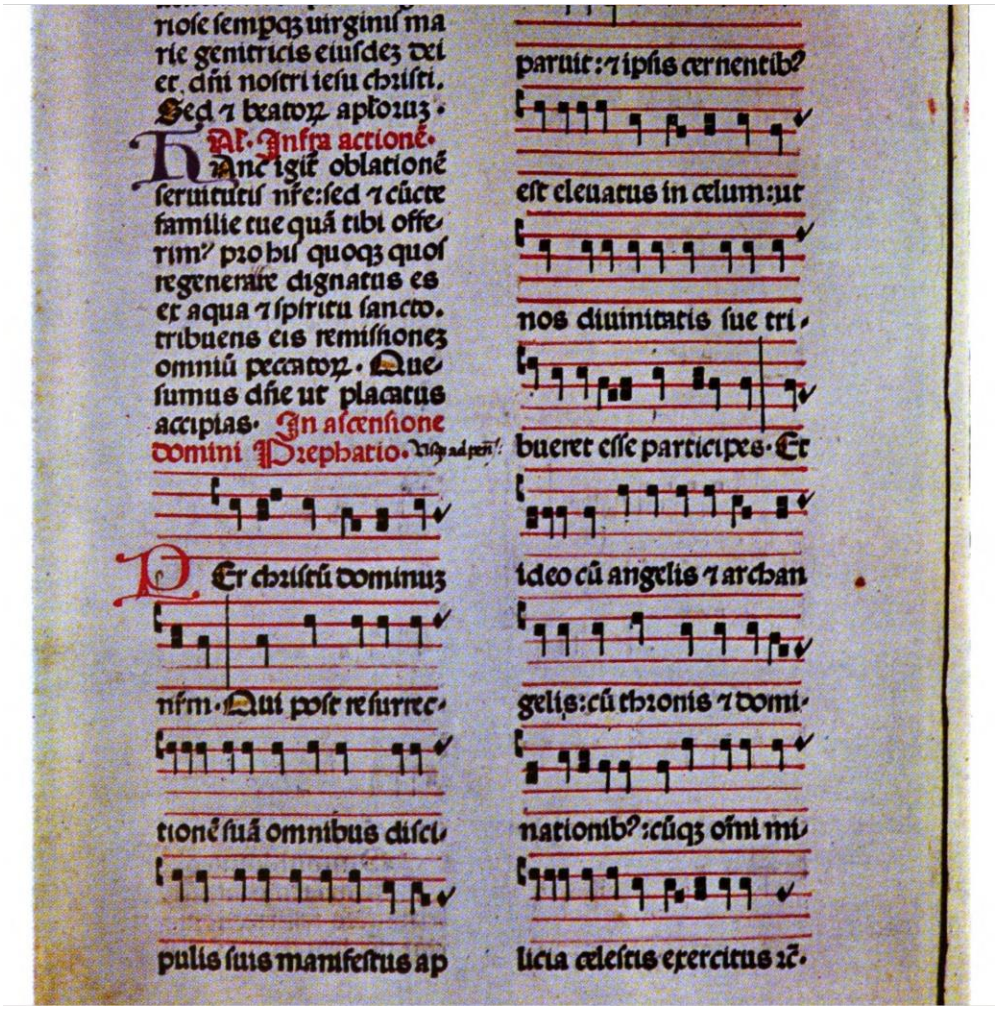
- How a composer communicates music to musicians
- Several systems worldwide; I focus on western notation
- Modern western music notation conveys:
  - Note pitches
  - Rhythms
  - Tempo
  - Dynamics (loud and soft)
  - Articulation (manner of playing the note)
- Notate all of these simultaneously
- Music engraving: process of typesetting music


p
mf

HISTORY OF MUSIC ENGRAVING

15th Century

- Printed music came about same time as printed text
- Most printed music was liturgical
- Early scores used moveable type
  - Scores printed in 2-3 stages
- More expensive than printing text
- Often times handwritten
- Moveable type had limited use into 19th century



Earliest known (dated) printed music, 1476

Earliest printed music from England, 1500

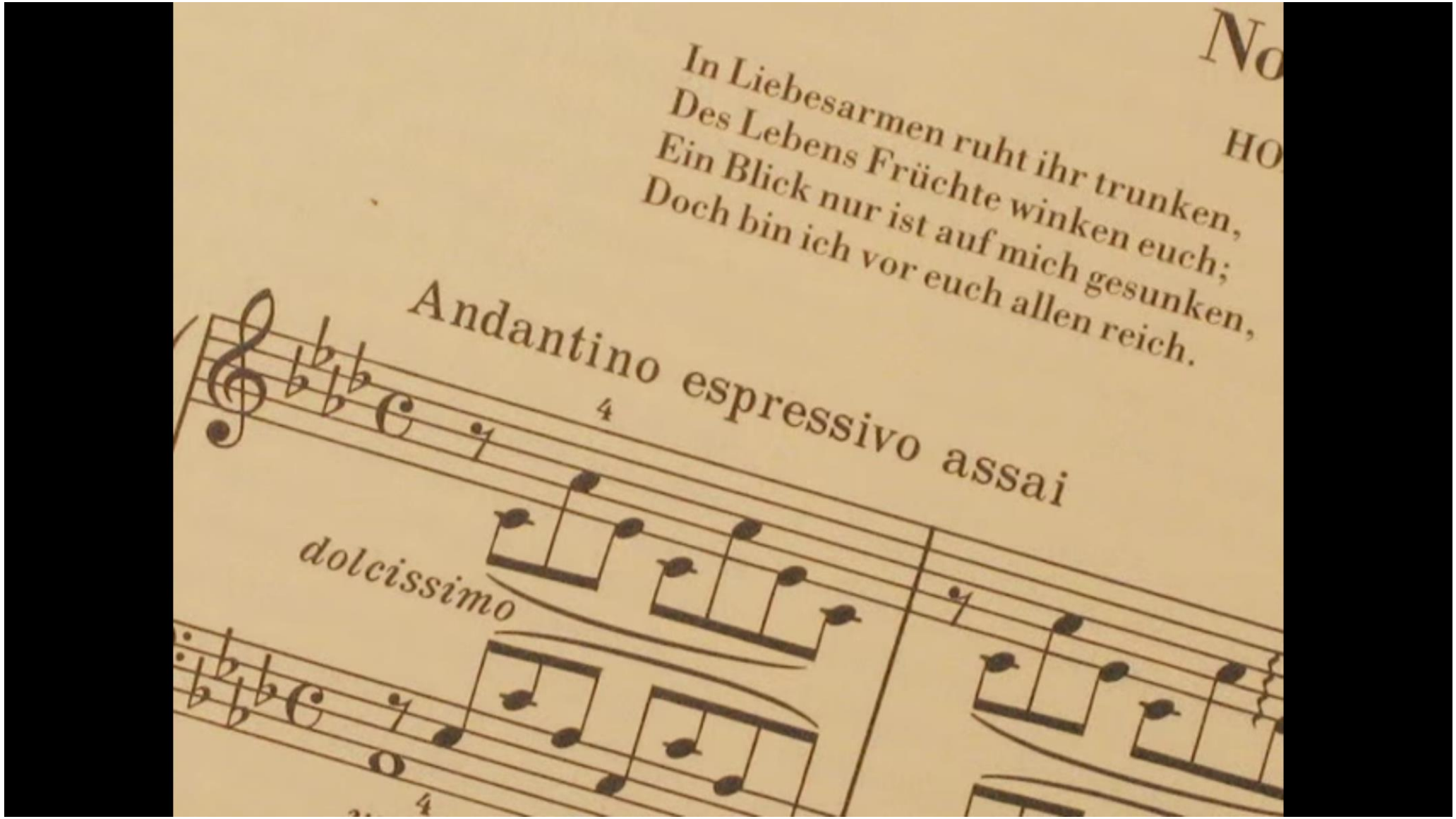
King, A. Hyatt. *Four Hundred Years of Music Printing.* Second edition., British Museum, 1968.

16th Century

- Musical notation becomes more complex
  - Movable type inflexible
- Began engraving music into plates of metal
  - Copper, later pewter/aluminum/zinc
  - Done by hand
  - Single page could take as long as 8 hours
- Where the term "music engraving" comes from
- Remained popular with publishers into 20th century
  - Even as late as 1990s

https://www.finalemusic.com/blog/when-music-engraving-was-engraved/

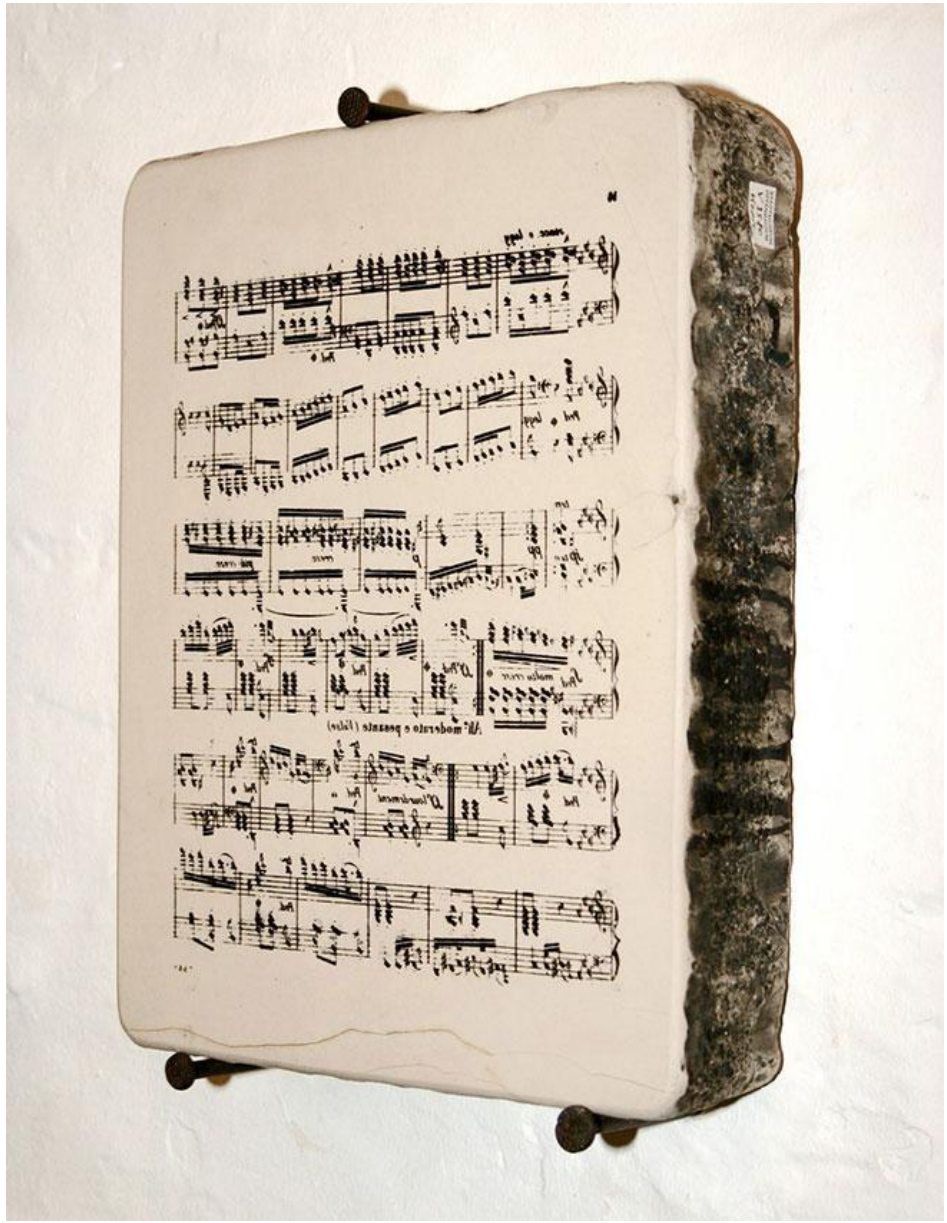
https://www.youtube.com/watch?v=C2k1Y2GzXDU



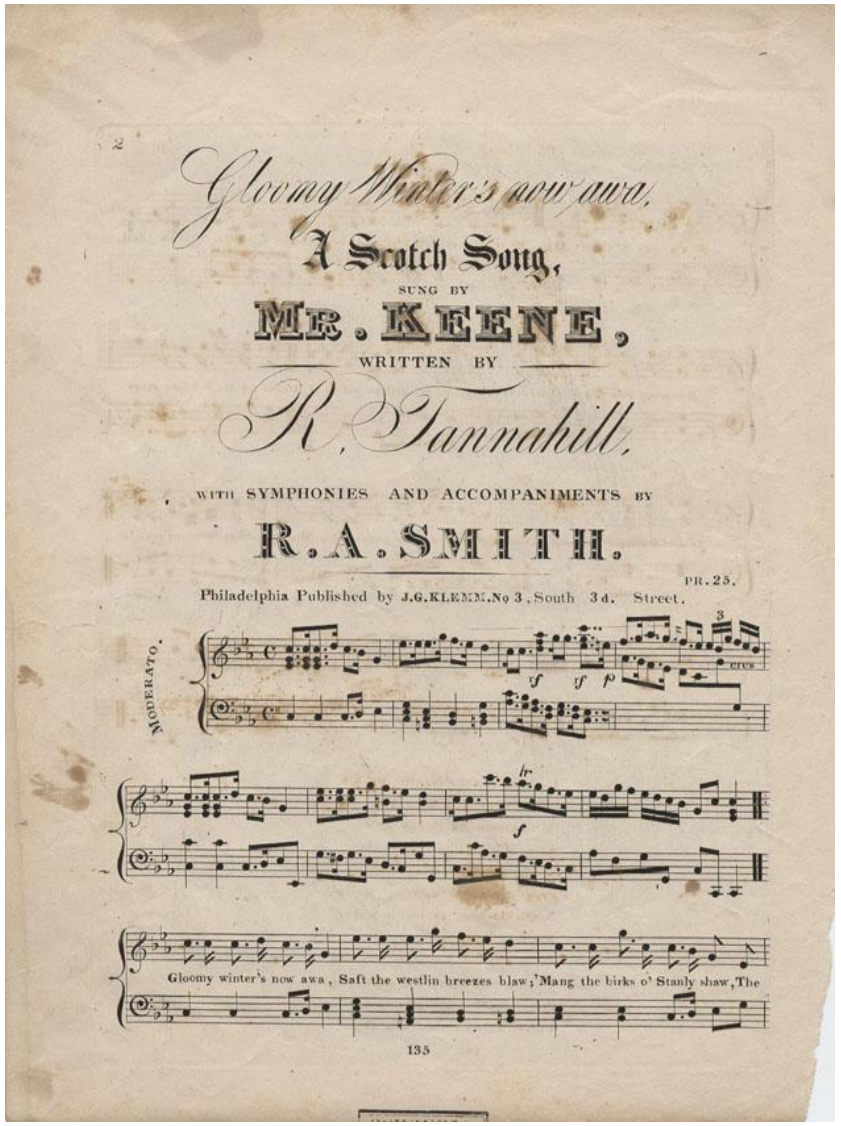
https://www.youtube.com/watch?v=BvyoKdW-Big

18th century

- 1796: Lithography invented
  - Draw on limestone with grease pen
  - Treat stone with chemicals
  - Ink sticks to where grease was
- Cheaper than metal engraving
  - Produces less polished scores
- Used alongside engraving
  - Cheaper alternative
  - Some publishers used both methods



https://musicprintinghistory.org/lithography/



https://irishsheetmusicarchives.com/Sheet-Music-Catalog/Gloomy-Winters-Now-Awa-IF-SL-01-975.htm

20th Century

- Software for typesetting sheet music
- Became popular with the rise of the personal computer
- Eventually replaced metal engraving as industry standard
- Many types of typesetting programs
  - Text based formatting
  - Scorewriters
  - SCORE

Text Based Editors

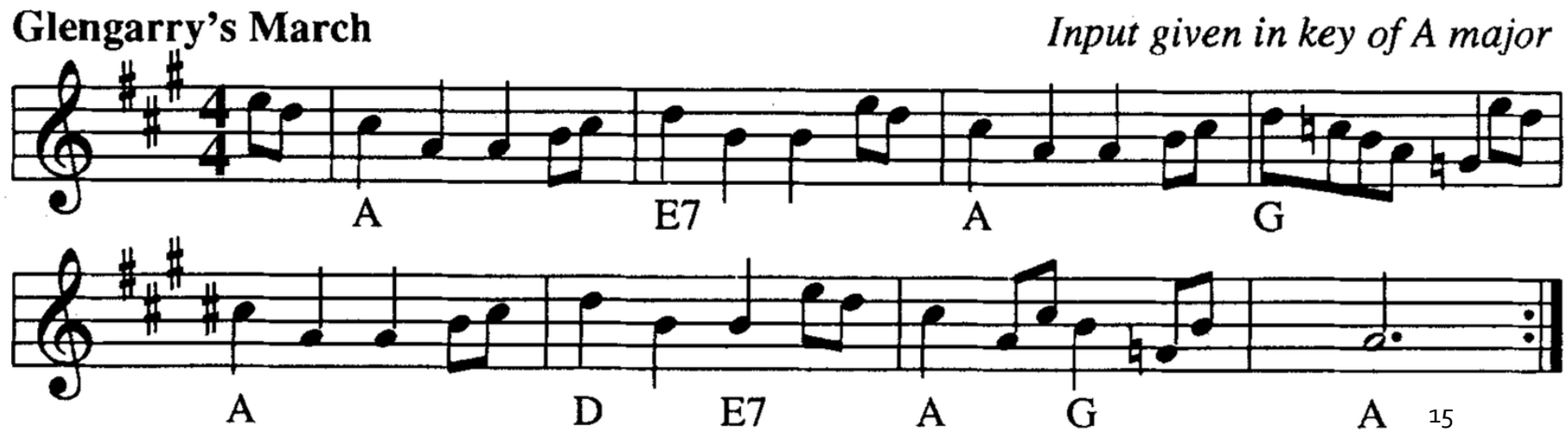
- Similar to TeX, troff
- Describe sheet music with text file
  - Program converts text input to pdf/ps/svg
- music
  - Released in 1987 by Eric Foxley
  - Music typesetting for troff
- MusiXTeX
  - Created in 1991
  - Music typesetting for TeX
  - Comes preprocessor PMX with more intuitive syntax
- Lilypond
  - Created in 1996
  - Standalone typesetting language

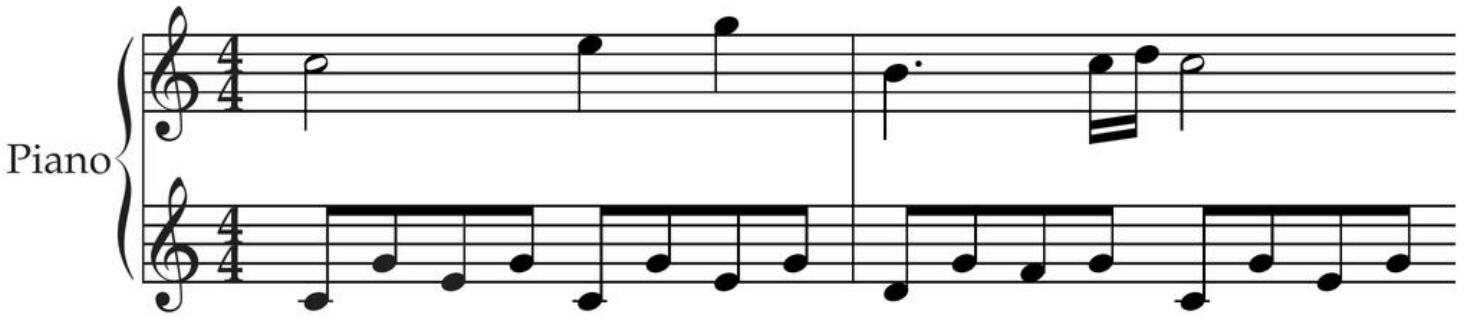
```
.MS
title="\fBGlengarry's    March\fP";
righttitle = "\fITyped in key of A major\fP";
timesig = 4.4;
key = a;
autobeam; # insert beams automatically
chords. # interpret text as chord names

e<d<|
c "A" a a b<c<|
d "E7" b b e<d<|
\-2|
d<"G" c=<b<a<g=e<d<|
\-2|
d "D" b b "E7" e<d<|
c "A" a<c<b "G" g=<b<|
a> "A" :|

.ME
```

music

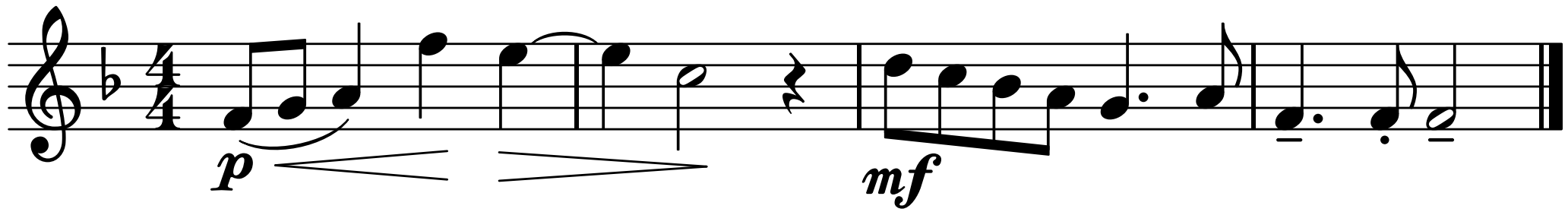




The coding is as follows:

```
\begin{music}
  \parindent10mm
  \instrumentnumber{1}                % a single instrument
  \setname1{Piano}                    % whose name is Piano
  \setstaffs1{2}                      % with two staffs
  \generalmeter{\meterfrac44}         % 4/4 meter chosen
  \startextract                       % starting real score
    \Notes\ibu0f0\qb0{cge}\tbu0\qb0g|\hl j\en
    \Notes\ibu0f0\qb0{cge}\tbu0\qb0g|\ql l\sk\ql n\en
    \bar
    \Notes\ibu0f0\qb0{dgf}|\qlp i\en
    \notes\tbu0\qb0g|\ibbl1j3\qb1j\tbl1\qb1k\en
    \Notes\ibu0f0\qb0{cge}\tbu0\qb0g|\hl j\en
  \zendextract                        % terminate excerpt
\end{music}
```

MusiXTeX

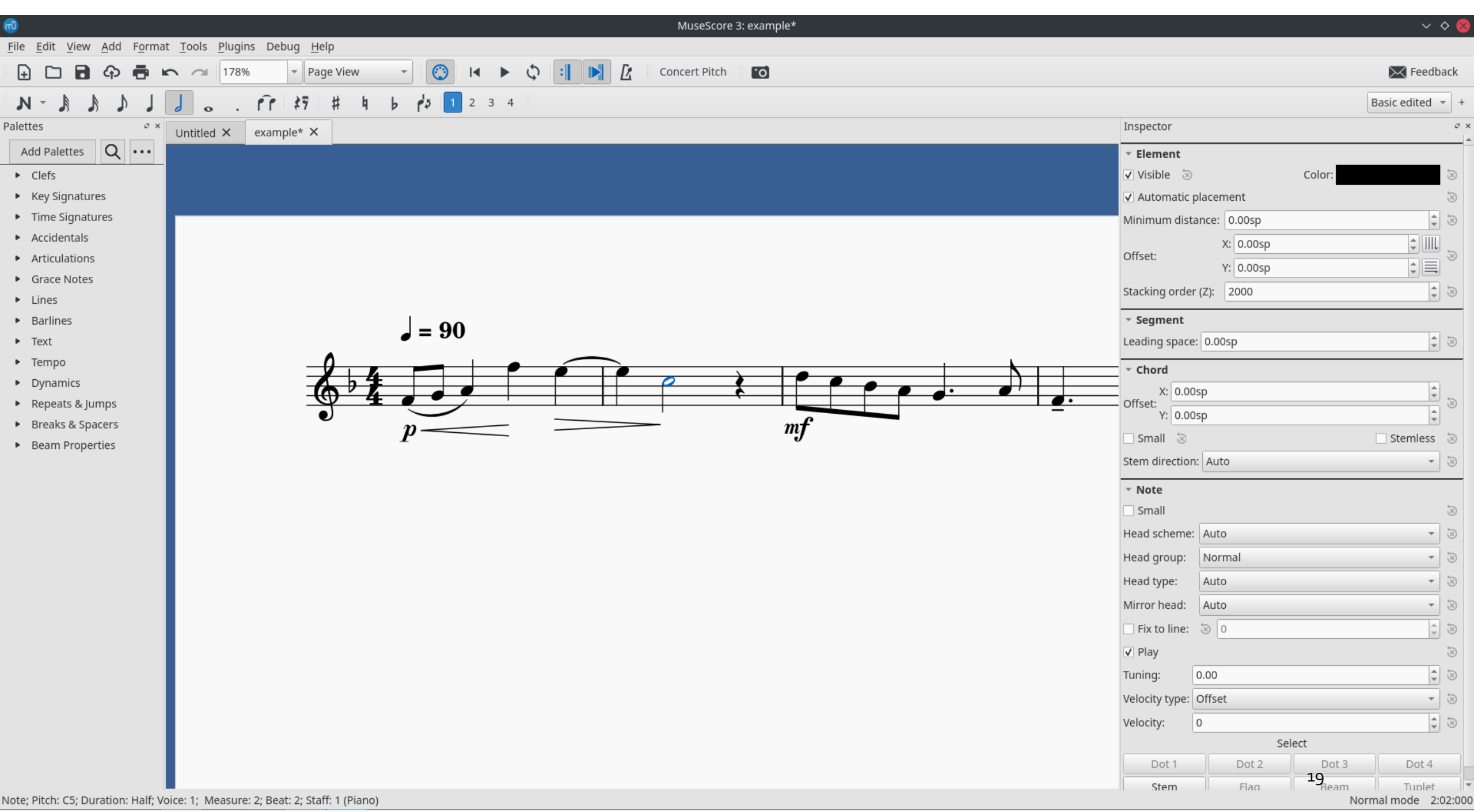



```
{
  \numericTimeSignature
  \time 4/4
  \clef treble
  \key f \major
  \relative {
    f'8\p\<(g8 a4) f'4\! e4~\> |
    e4 c2\! r4 |
    d8\mf c8 bes8 a8 g4. a8 |
    f4.-- f8-. f2-- \bar "|."
  }
}
```

Lilypond

Scorewriters

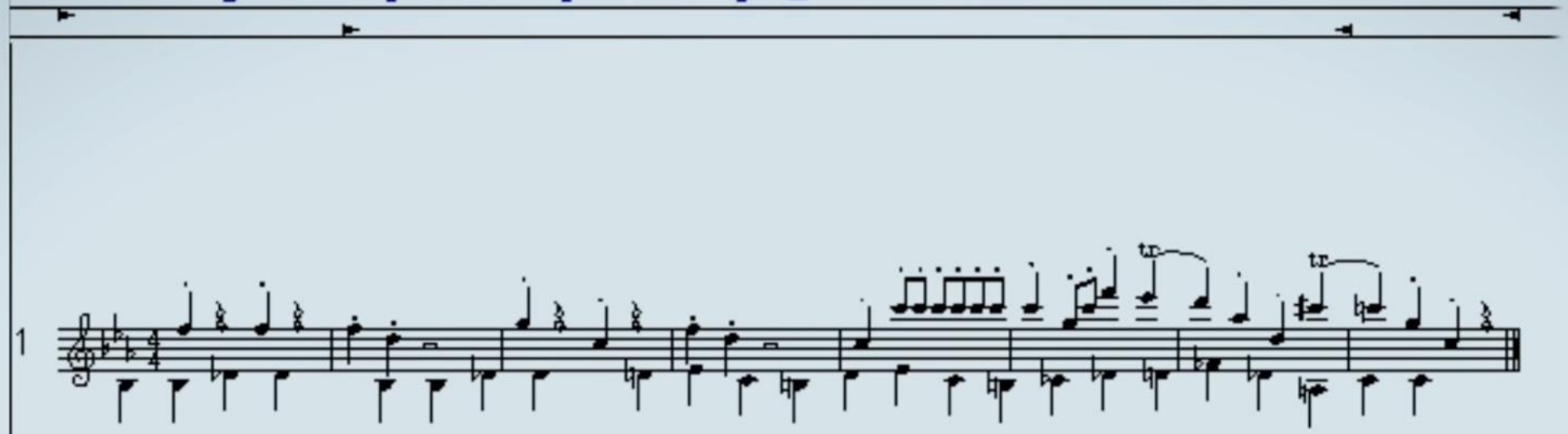
- Similar to WYSIWYG editors like Word
  - GUI for typesetting sheet music
- Most popular type music engraving program
  - Easier/more intuitive to learn
- Used by publishers
  - Give easy access to fine-grain typesetting options
- Used by composers
  - Allow for playback and recording of music
- Several prominent scorewriters:
  - Finale (1988, Windows)
  - Sibelius (1993, Mac)
  - Musescore (2002, Cross platform, Open source)
  - Dorico (2016, Windows, Mac)


MuseScore 3: example*
File Edit View Add Format Tools Plugins Debug Help
178%
Page View
Concert Pitch
Feedback
Basic edited
Palettes
Add Palettes
Clefs
Key Signatures
Time Signatures
Accidentals
Articulations
Grace Notes
Lines
Barlines
Text
Tempo
Dynamics
Repeats & Jumps
Breaks & Spacers
Beam Properties
Untitled
example*
♩ = 90
p
mf
Inspector
Element
Visible
Color:
Automatic placement
Minimum distance: 0.00sp
Offset:
X: 0.00sp
Y: 0.00sp
Stacking order (Z): 2000
Segment
Leading space: 0.00sp
Chord
Offset:
X: 0.00sp
Y: 0.00sp
Small
Stemless
Stem direction: Auto
Note
Small
Head scheme: Auto
Head group: Normal
Head type: Auto
Mirror head: Auto
Fix to line: 0
Play
Tuning: 0.00
Velocity type: Offset
Velocity: 0
Select
Dot 1
Dot 2
Dot 3
Dot 4
Stem
Flag
Beam
Tuplet
19
Note; Pitch: C5; Duration: Half; Voice: 1; Measure: 2; Beat: 2; Staff: 1 (Piano)
Normal mode
2:02:000

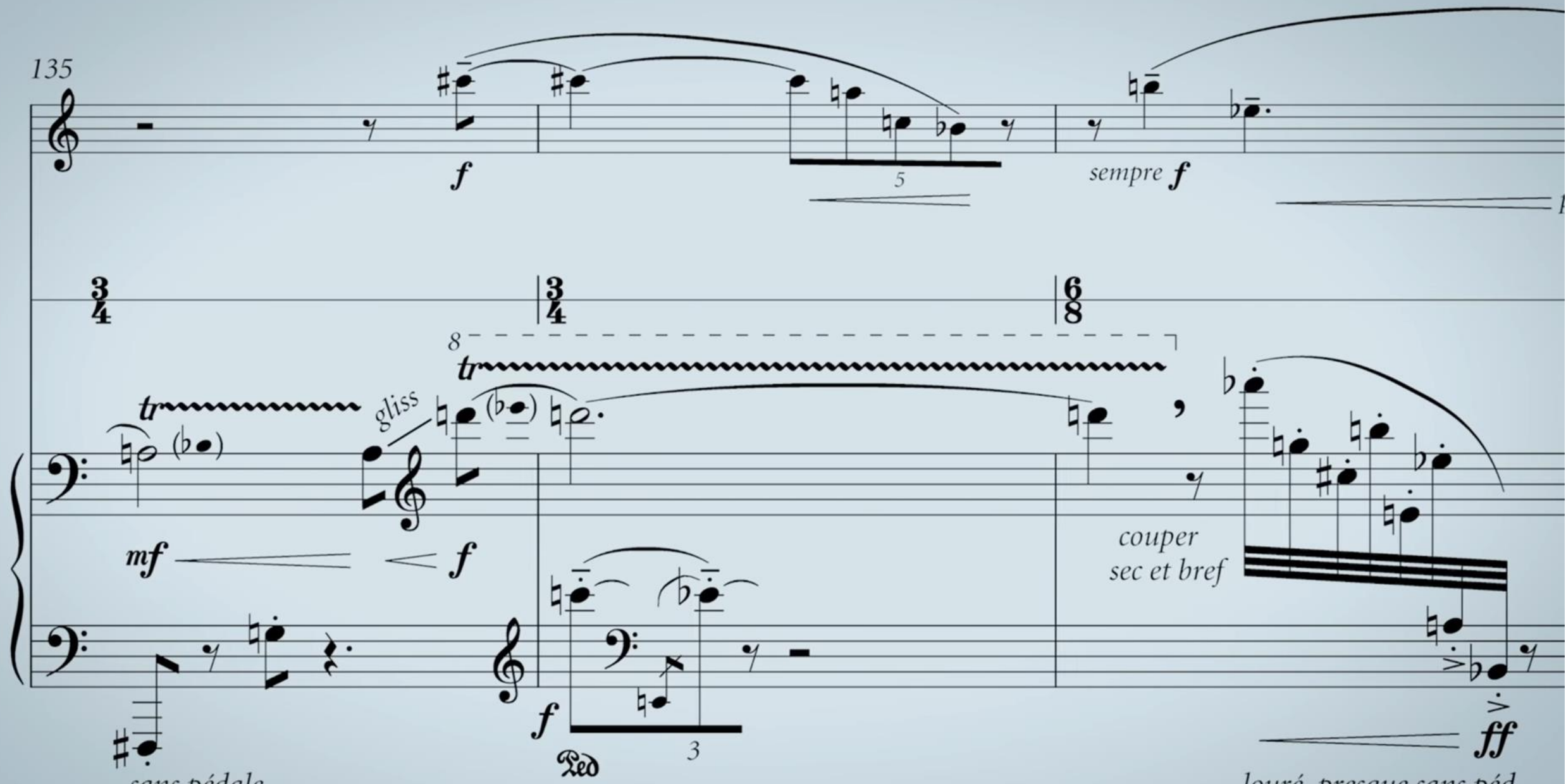
SCORE

- Released in 1987 by Leland Smith
- Written for MS-DOS in FORTRAN
- Text based input, simplified vector graphics
  - Output pdf
- Industry standard for many years
  - Produced high quality scores
  - Difficult to learn
  - Still sees usage today
- Became abandonware after Smiths death
  - Source code unavailable
  - New copies not being sold

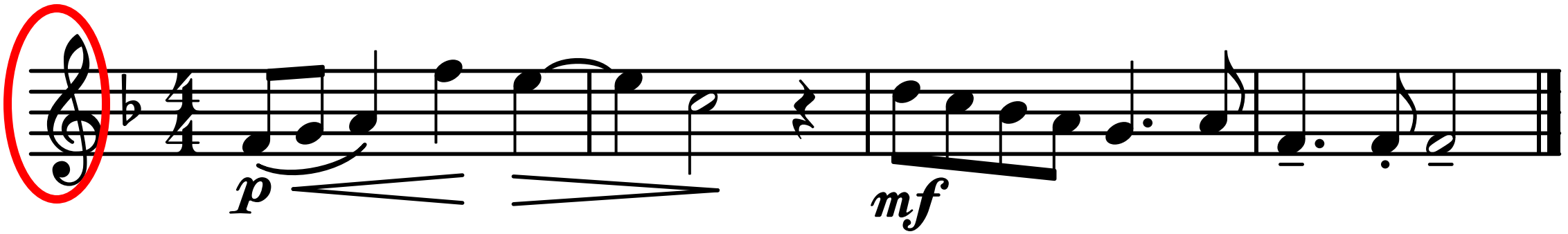
```
Staff # =  1   Left End =   0   Vert. Pos =   0   Size = 1.00   Right End = 200
Spacing =  1   Left Pos =  39   Right Pos = 177  Meter =  4/ 4   Key Sig. = Eb
Type notes,etc>sd/b3/b/df//ri/b/b/df//ri/dn/e/c/bn/d/e/c/bn/cf/df/dn/ff/df/an/c/
;
Enter 26 rhythms ->q/e//h/w/q/e//h/w/qx8_
```



1 DblWh	2 Whole	F3 1/2	F4 1/4	F5 1/8	F6 1/16	F7 1/32	F8 1/64	9 <esc>	10-->	?
Quint	Triple	1/2.	1/4.	1/8.	Dot	BackSpc	/	;	1/12	?


135
f
5
sempre f
3/4
3/4
6/8
8
tr
tr
gliss
mf
f
couper
sec et bref
f
3
Ped
ff
sans pédale
louré, presque sans péd

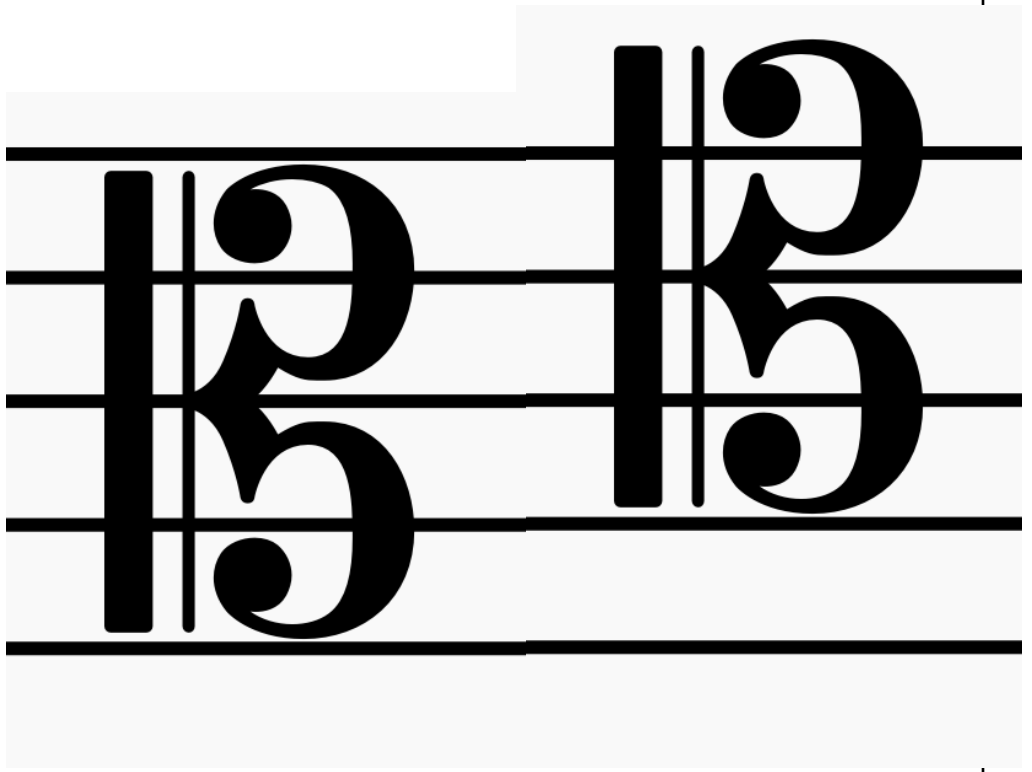
SHEET MUSIC TYPESETTING

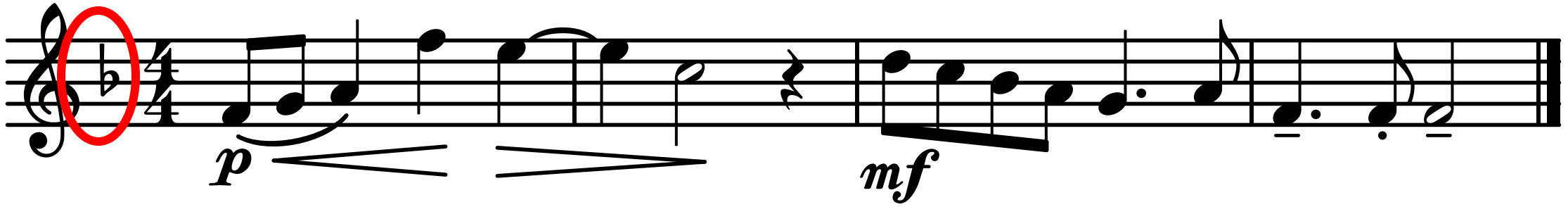


Clef

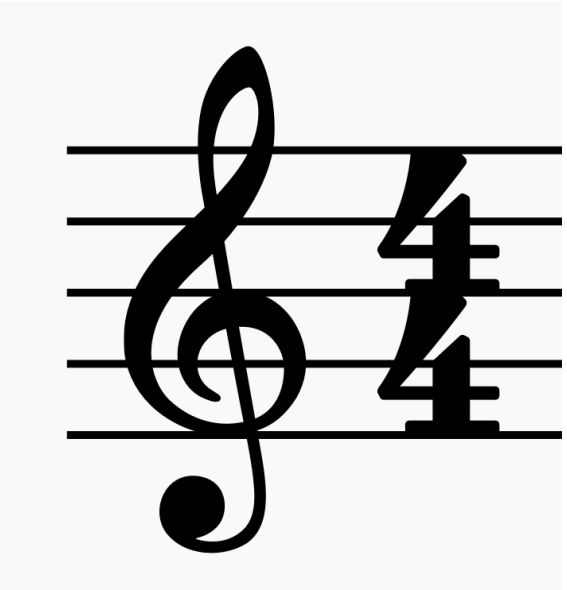
Several kinds of clefs

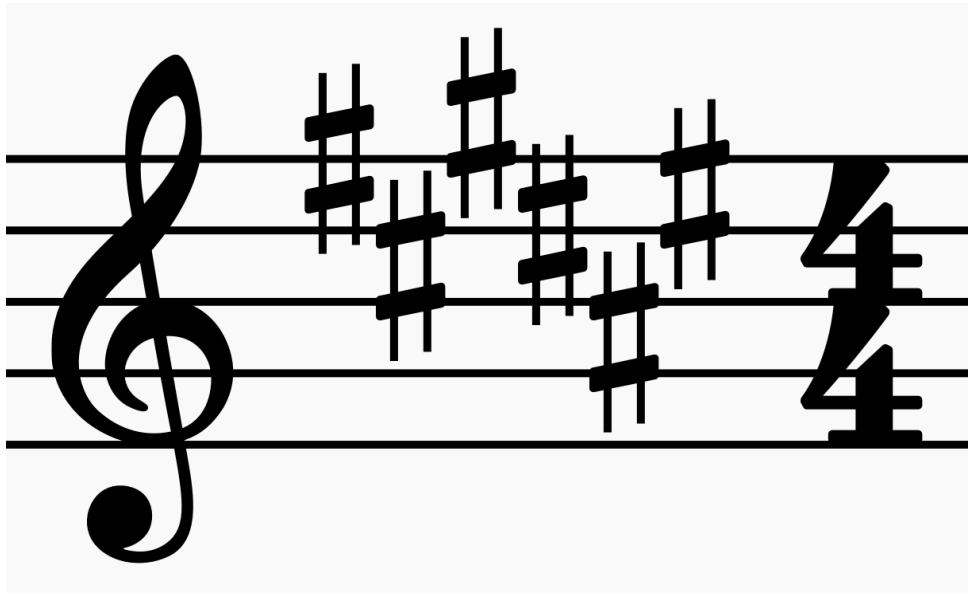
Vertical Position Matters

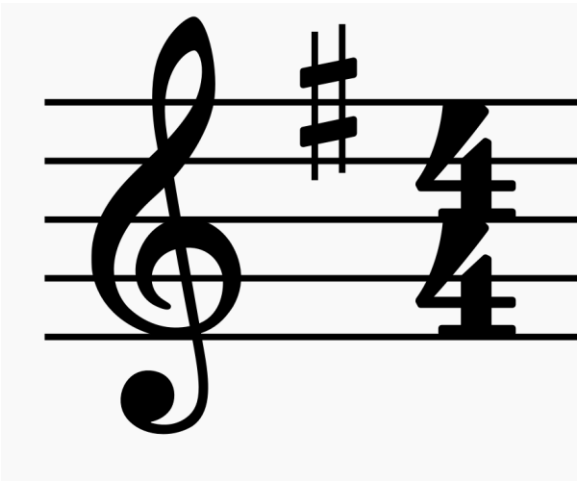




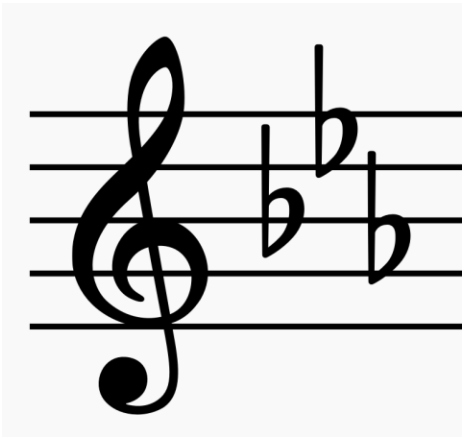
Key Signature

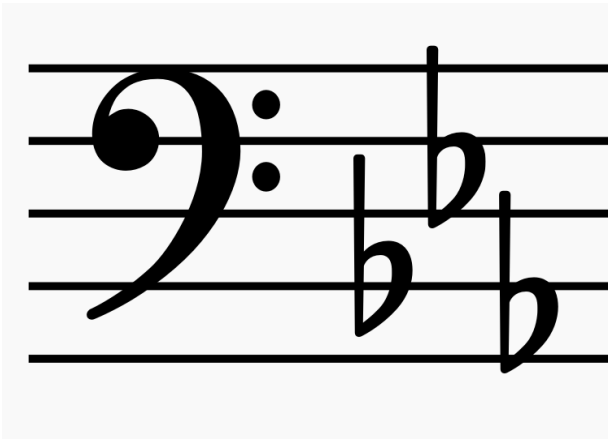


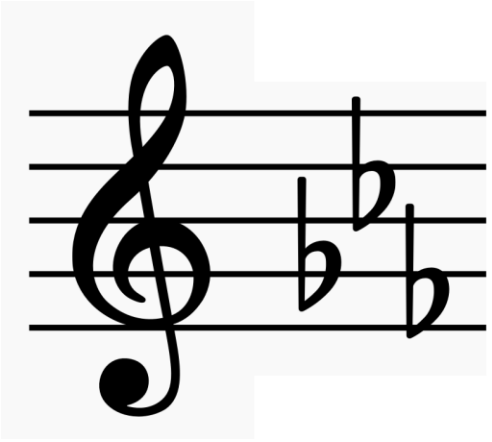


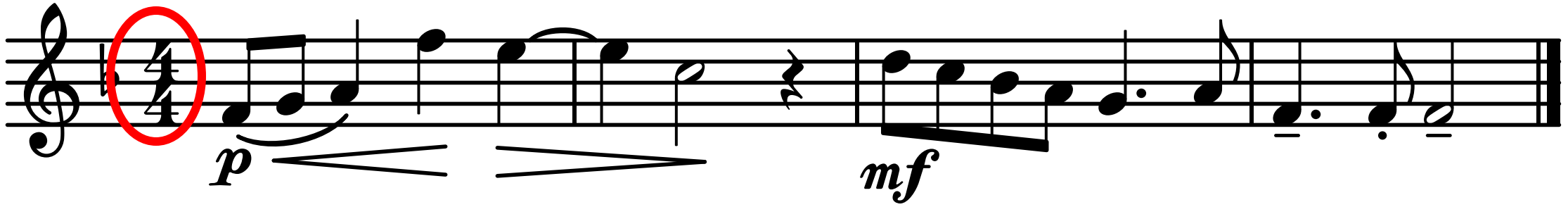


Vertical Position Depends on Clef

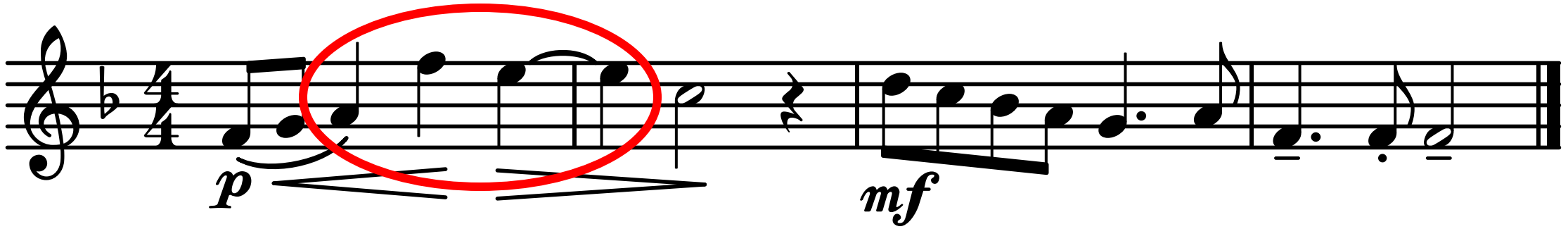






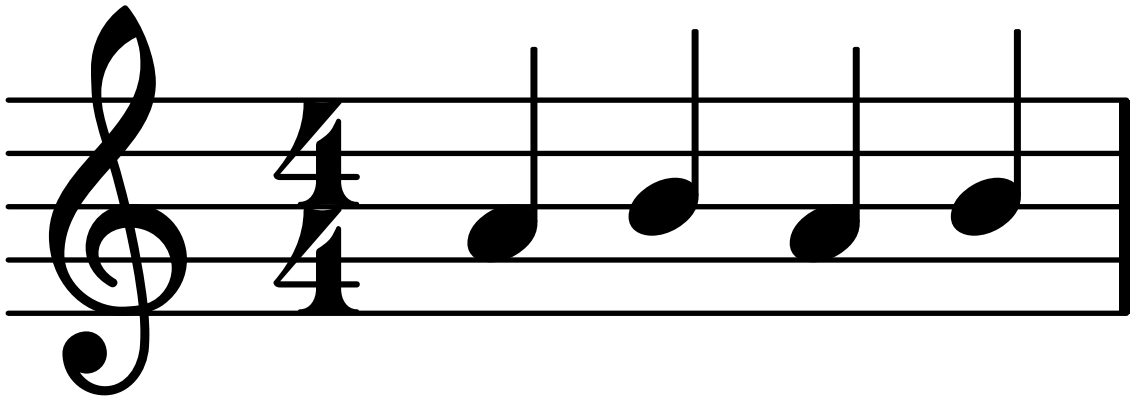


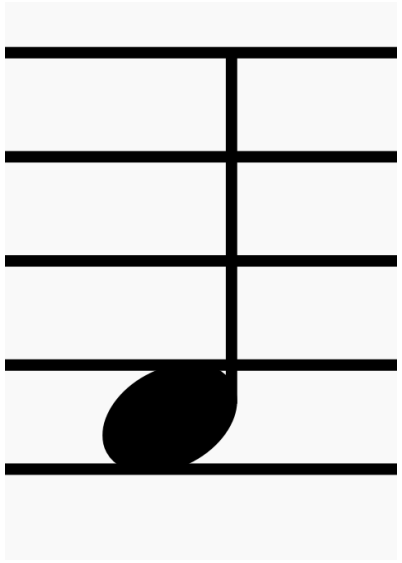
Time Signature

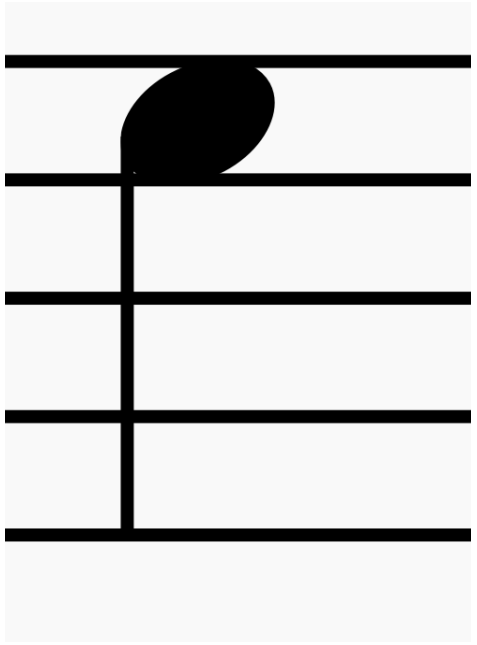


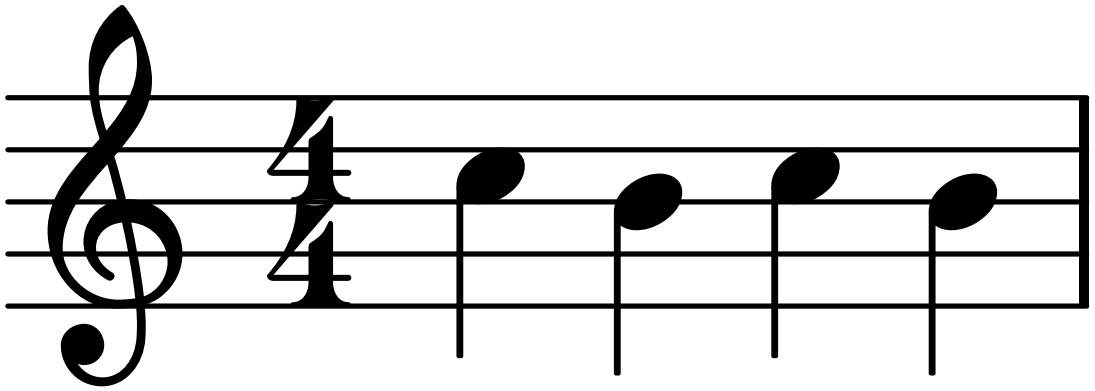
Note stems

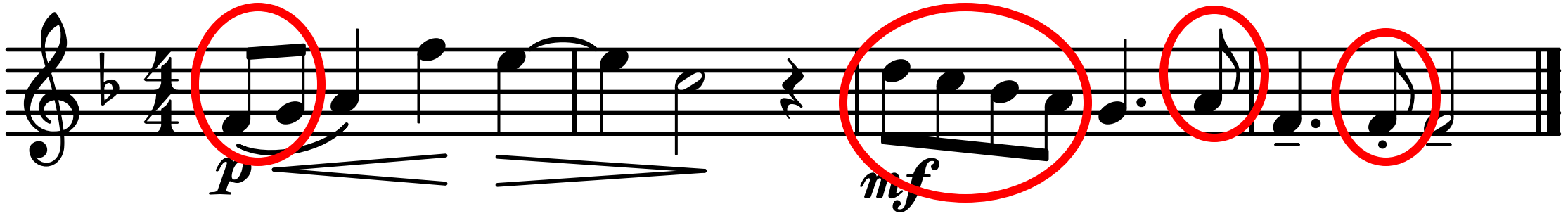
Stem Direction



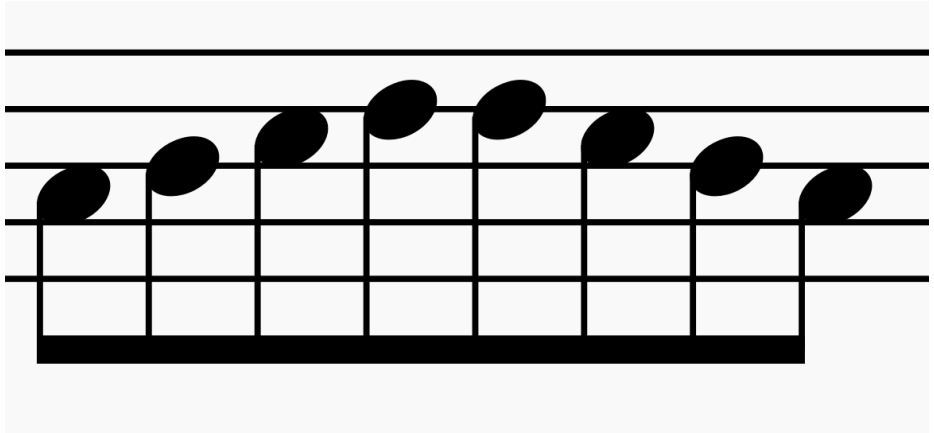


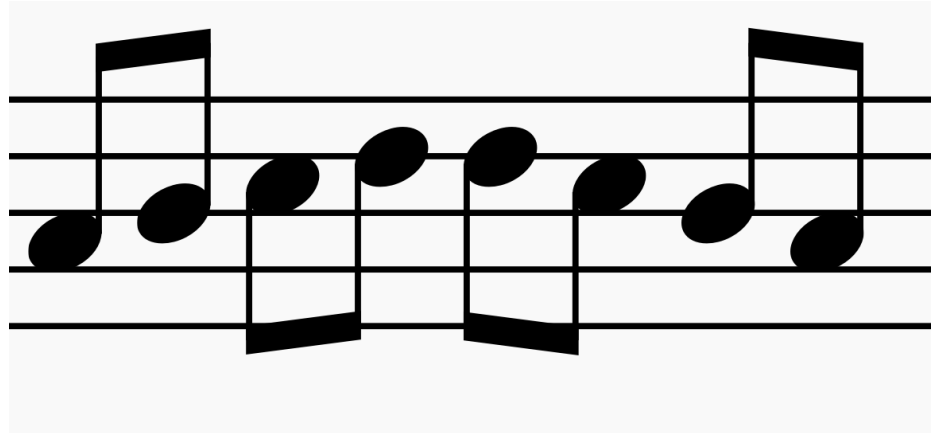


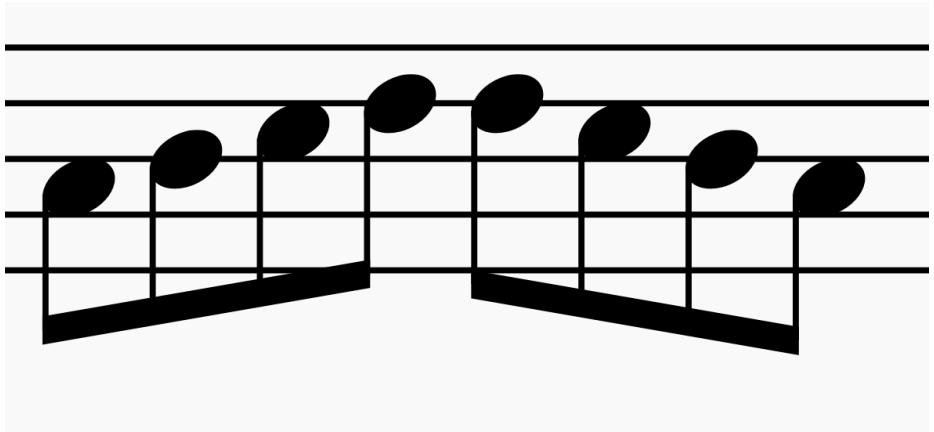


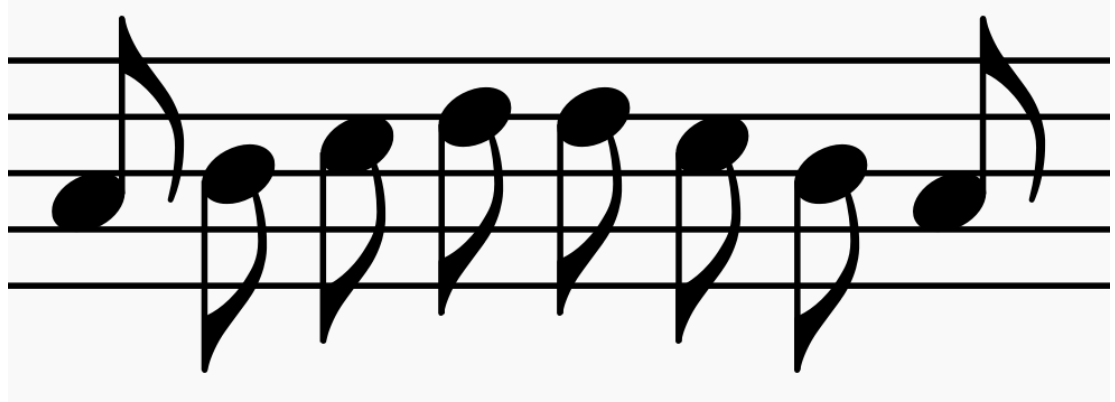


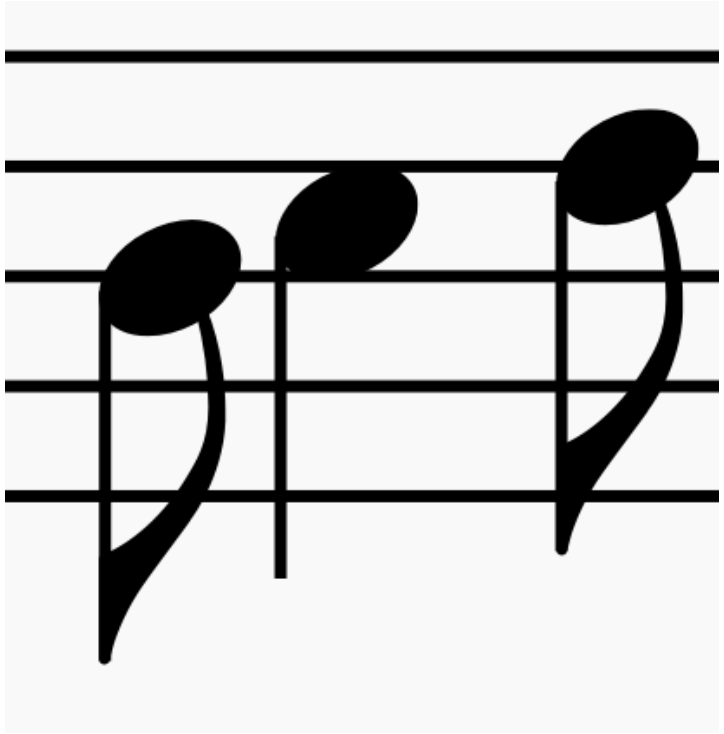
Eighth Notes

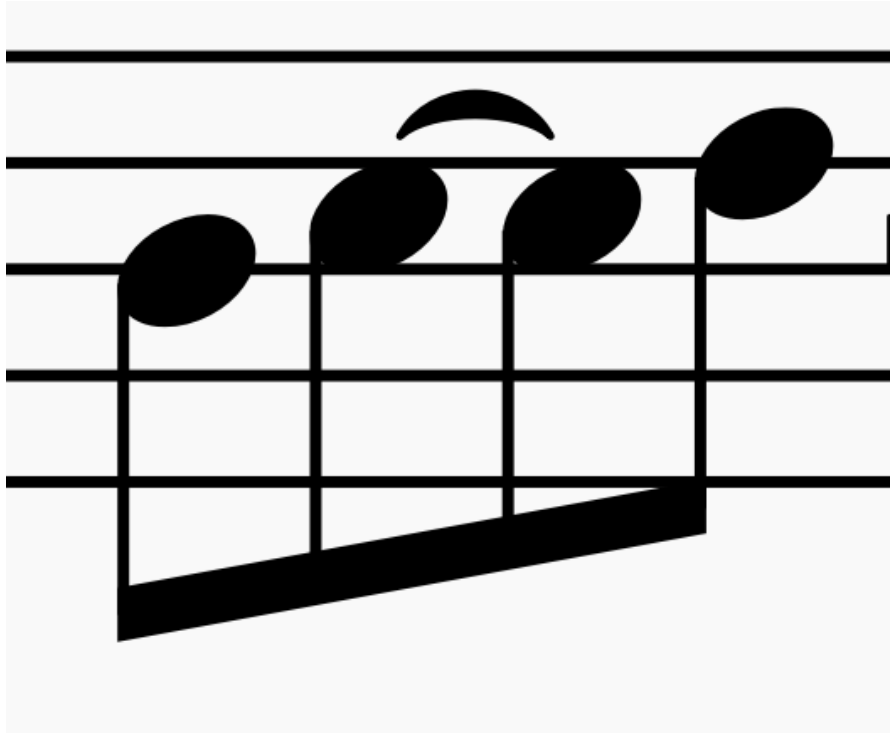


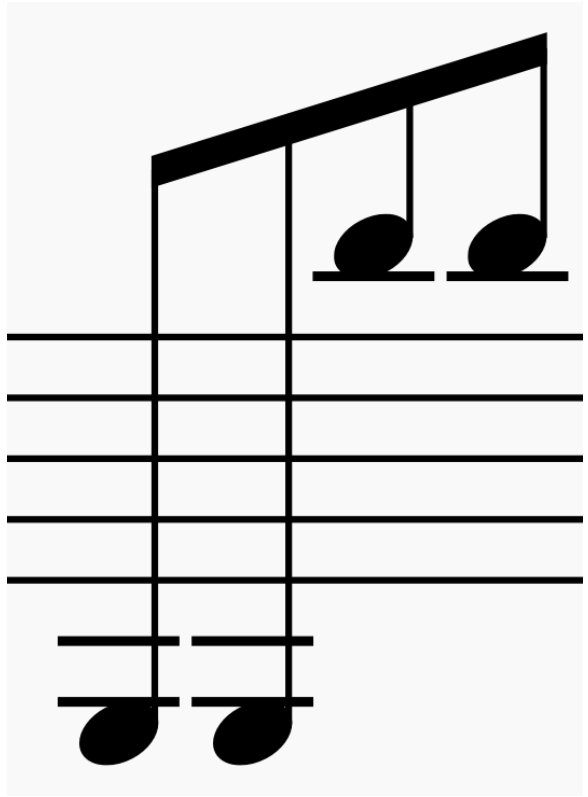


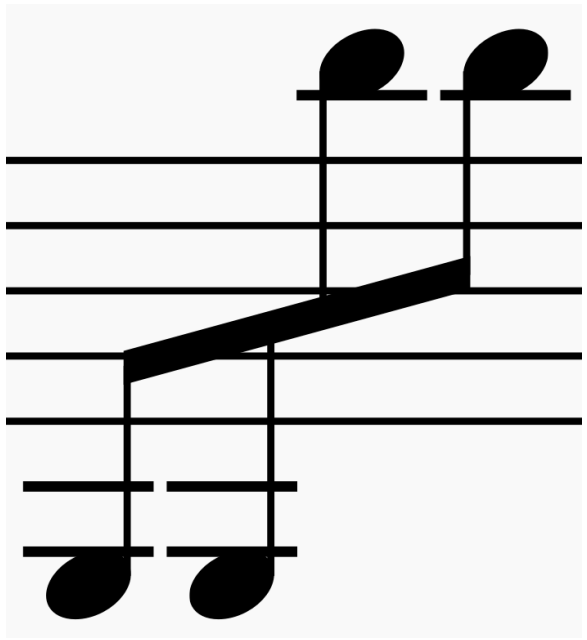


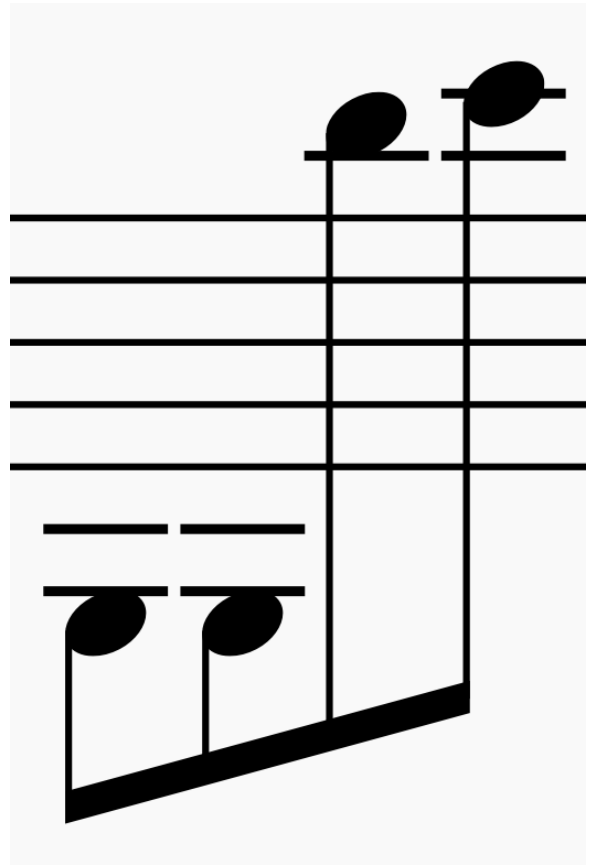


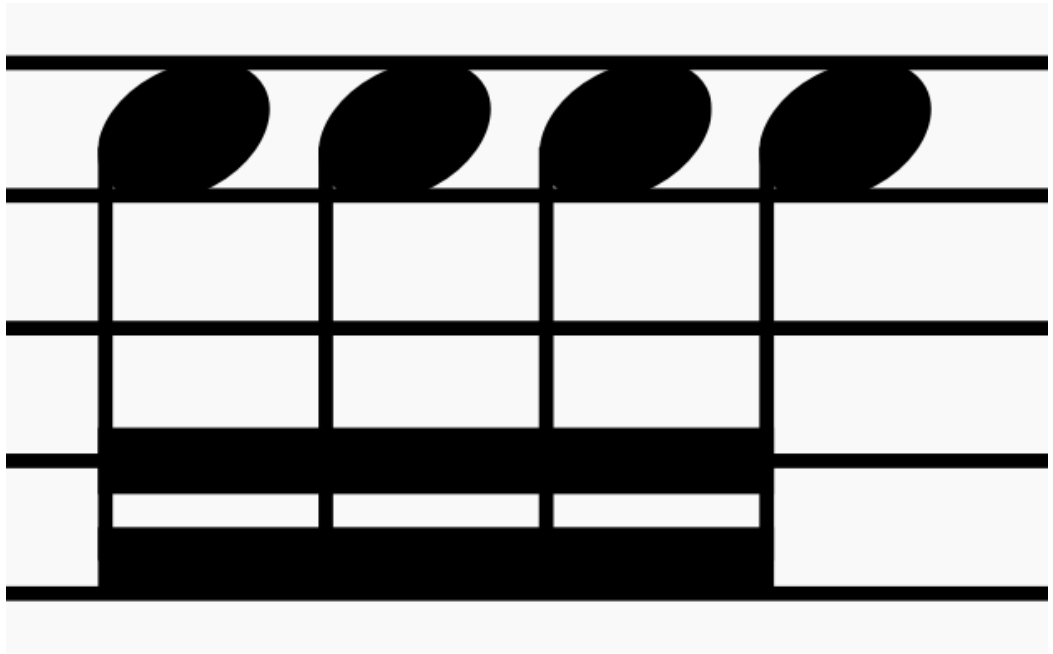


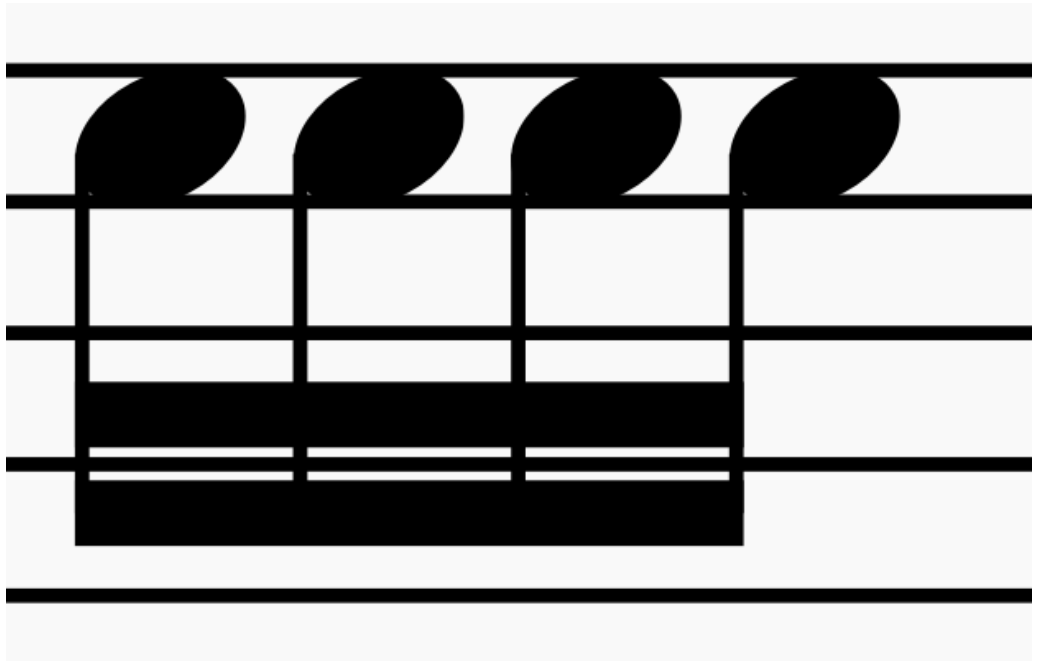


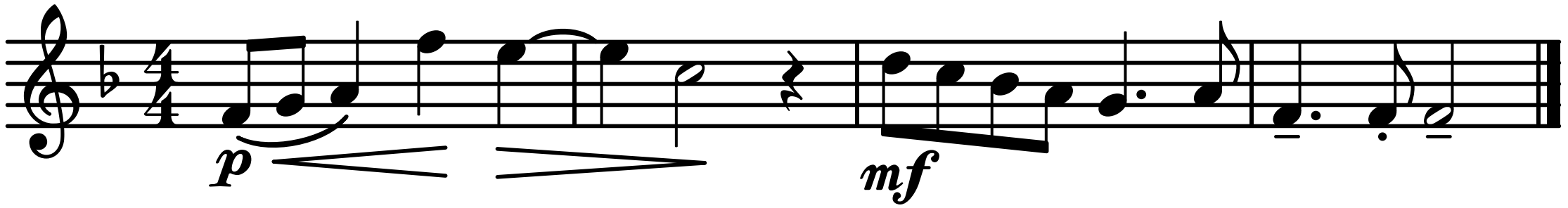












Questions?

- King, A. Hyatt. Four Hundred Years of Music Printing. Second edition., British Museum, 1968.
- Gould, Elaine. *Behind Bars: the Definitive Guide to Music Notation* . Faber Music, 2011.
- Holab, William. *SCORE User's Guide*. San Andreas Press, 1988.
- Foxley, Eric. "Music—A Language for Typesetting Music." *Software—Practice and Experience*, vol. 7, no. 8, 1987, pp. 485–502.
- Vogel, Oliver, et al. *MusiXTeX: Using TeX to Write Polyphonic or Instrumental Music*. 2021.
- *YouTube*, YouTube, 25 Sept. 2011, www.youtube.com/watch?v=C2k1Y2GzXDU .
- *YouTube*, YouTube, 14 Mar. 2016, www.youtube.com/watch?v=BvyoKdW-Big .