Modal and Harmonized Modal Scales

for the Spanish Guitar

with notes on underlying theory

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- fourth edition -

Modal and Harmonized Modal Scales for the Spanish Guitar

These scales are written in all modes along with the associated harmonic and melodic minors of each distinct diatonic key signature over the full range of the Spanish guitar. Following each basic scale are harmonized triads and seventh chords covering a single octave. While the scales are fully fingered for the left hand, variations on both fingering and harmonization are possible. Empty staves have been supplied at the end of each section for possible use by the reader. Notation of accidentals follows the convention that they are cancelled in following measures unless explicitly re-written. A preface outlines theory underlying these scales and defines some basic chord structures.

The scales should be played using right hand techniques and rhythmic patterns appropriate to individual styles and possible weaknesses to be strengthened. Single note scales may be played both with the thumb and with alternations of two or more fingers. It is recommended that *apoyando* strokes (wherein the thumb or finger rests on the adjacent string after each stroke) be used to develop precision, strength and speed. Harmonized scales may be played with various arpeggio, tremolo and strumming techniques.

Application to these scales will bestow benefits in addition to mere stretching and strengthening of the hands. Such benefits include increased facility in reading over the full range of the guitar and enhanced awareness of sonic relationships between sequences of notes and triads that will be of benefit in composition and improvisation. These scales might be integrated into a daily regimen in which, perhaps, all scales in a single key signature are played. All keys may be so covered over a cycle of 12 days. It is also possible to give emphasis to specific keys or to scales of specific modes such as the Ionian (major), melodic minor or if, for example, flamenco is of specific interest, the Phrygian. In general, however, it is probably best to broaden the advice of Andres Segovia, of whose Diatonic Major and Minor Scales this work is an extension, and recommend that equal attention be given to all modes in all keys.

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<u>Derivation of the Scales</u>

A tone is a vibration at a certain frequency. The terms ***harmonic***, ***overtone*** and ***partial*** often are used more or less interchangeably to refer to multiples of a given frequency although they can carry different meanings. In consideration of vibrating strings, wavelength may be more easily envisioned (and measured) – if all else is held equal, multiplying the frequency of a tone is equivalent to dividing its wavelength by the same factor (inverse multiple).

When a string under tension is plucked its fundamental vibration will take the form of a single, smooth curve over its entire length. But in addition to this, especially as a function of where the string is plucked, overtones resulting from multiple vibrations of half, one third and smaller fractions of its length will arise. This can be heard in comparing the mellow, "pure" sound of a string plucked at its mid point, from which the full wave vibration will predominate, with the increasingly hard, acute sound produced as the string is plucked ever closer to one end. This "harder" sound arises partly from an increase in higher harmonics relative to the fundamental tone. Individual higher harmonics can be distinguished with a good ear (or spectrum analysis tools) if this is done on a reasonably good guitar. This effect is commonly accentuated in guitar music by damping (lightly stopping) a string at some fraction of its length while it is plucked.

The meanings of the word "consonance" and of the related "concordance" very likely arose from observation of such simulaneous production of tones from a single vibrating source. It is from such consonant tones that ideas of musical harmony evolved. The combinations of a second harmonic with its fundamental tone in the ratio of two to one, of the third harmonic with the second (3:2), fourth with third (4:3) and fifth with fourth (5:4) define (and are heard as) basic consonances although consonant combinations of other and ever higher harmonics can be identified.

Combining or replacing a tone with its double or its half does little to change the perceived quality of the resulting sound. This being the case, it can been seen (and heard) that the consonance of the third and second harmonics of a tone is effectively equivalent to that of one half of these: $^{3}/_{2}$ of the fundamental tone and the fundamental itself. This "$^{3}/_{2}$ tone" can be referred to as the ***third partial*** of the fundamental. Similarly, a "$^{5}/_{4}$ tone" can be called a ***fifth partial***. This uses the term "partial" to identify a tone within the range of a base tone and its double that is consonant with the base tone in the same ratio as two of its harmonics.

This usage has physical basis in describing an unevenly divided partial vibration of a string which (if it were physically possible) would lie in a given harmonic relationship with the fundamental vibration of the full string. The higher of these harmonics gives the partial its name. This differs from the common usage of "partial" as more or less synonymous with "harmonic."

A fundamental tone and its third (3:2) and fifth (5:4) partials are basic tones of pure harmony and have come to be referred to, respectively, as the ***tonic***, ***dominant*** and ***mediant*** of a fundamental tone or keynote. Sounded together they define the ***tonic major triad***. This can be considered as simply the tonic itself additionally "flavored" with the third and fifth partials almost inevitably produced to some extent in sounding the tonic alone. Note, however, that if these auxiliary tones are not precisely tuned to the partials of the tonic at least some discord will result.

The foundation of European scales and harmony is commonly ascribed to Pythagoras. The Pythagorean scale is derived from identifying succeeding third partials of a base tone. Each pair so defined falls in the perfect harmonic interval of 3:2. If the first seven of these tones (halved as necessary to fall into the range of the initial tone and its double) are arranged in ascending order they will constitute a scale of tones separated by one of two harmonic intervals – $^{9}/_{8}$ and $^{256}/_{243}$. The eighth of these tones breaks this pattern, falling approximately in the middle of the interval between the base tone and the next higher of the seven. Exactly twice the base tone lies an additional interval of $^{9}/_{8}$ above the highest note of this seven note scale.

Intervals of "seconds," "thirds," etc. are identified by counting the inclusive steps between two tones. It can be seen (and heard) that all fifths of this scale fall in the precise harmonic ratio of 3:2 except for the one starting on the seventh step (the last of the third partials used to define this scale). This is a *tritone*, so named because it spans three whole tones rather than the three and a half of the perfect fifths in the scale of 12 half-tone steps which later developed.

The fourths of this scale are inversions of the fifths and also are all "perfect," falling in the harmonic ratio of 4:3, except for the tritone interval, now inverted, lying between the 4^{th} and 7^{th} steps.

The seconds of the Pythagorean scale have been seen to be of two different sizes. So are the thirds – $^{81}/_{64}$ and $^{32}/_{27}$. The same applies to sixths and sevenths. The two interval sizes in each of these cases are distinguished as ***major*** (larger) and ***minor*** (smaller).

A problem with Pythagorean thirds is that a major third from a base tone lies very near its fifth partial – $^{5}/_{4} = {}^{80}/_{64}$. The minor third – $^{32}/_{27} = {}^{160}/_{135}$ – lies very near another harmonic interval of the base tone – $^{6}/_{5} = {}^{162}/_{135}$. The result is that Pythagorean thirds sound (and are) discordant. In general it will be found that no scale of 7 tones can be created whose thirds and fifths are all "perfect."

This led to the development of other systems of intonation which pitched the harmonic purity of some intervals to the dogs in favor of others and, finally, to equal temperament, which abandoned all attempt at harmonic purity except for that of even multiples of tones. One of the former, so-called "just" intonation, may be derived as follows.

A fourth has been seen to be $^{4}/_{3}$ of a tonic. The "dominant" of this tone ($^{3}/_{2}$ x $^{4}/_{3}$) is twice the tonic or, effectively, the tonic itself. For this reason the fourth has been called the ***subdominant***. The subdominant lies at the same harmonic distance *below* the tonic as the dominant does *above* it.

If triads similar to the tonic major triad are built using the subdominant and dominant tones as "tonics," a total of seven distinct tones are defined within the base interval from a fundamental tone up to its double. These comprise the basis of the classical European major scale. The "mediant" (fifth partial) of the subdominant is a new tone called the ***submediant***. The "dominant" of the subdominant, as mentioned above, is the original tonic. The "mediant" of the dominant is called the ***leading tone***, probably because it falls just below and "leads into" the tonic. The "dominant" of the dominant falls above the original tonic and called the ***supertonic***.

In ascending order of pitch (frequency), the seven tones of the major scale are the tonic, supertonic, mediant, subdominant, dominant, submediant and leading tone. They are also commonly designated by numbers 1 through 7, letters A through G or ***solfeggio***, the syllables do-re-mi-fa-so-la-ti. The next higher "1," double the original tonic, is called the ***octave*** (eighth) in deference to these seven basic tones.

The scale is called ***diatonic*** because it is made up of tones separated by intervals of two sizes, one approximately half the other. Half steps between the full intervals define ***chromatic*** tones. These may be identified in various ways.

An approach to doing so arises from noting that, in the major triad, if the ratio of 3 to 1 is $^{5}/_{4}$ and that of 5 to 1 is $^{3}/_{2}$, then that of 5 to 3 must be $^{6}/_{5}$. When considered from any base tone this interval is called a ***minor third*** to distinguish it from the larger "normal" 1 to 3 interval, the $^{5}/_{4}$ ratio, a ***major third***. Note that a minor third over a base tone is that tone's ***sixth partial***. More such partials will arise in what is to follow.

Three chromatic half steps may be defined by reducing each of the three major thirds defined on the diatonic scale to minor thirds. The term ***flat*** is applied to lowered tones and these are identified as 3 flat, 6 flat and 7 flat. Just as a minor third can be defined as a reduced major third, a major third can be defined as an increased minor third. Increasing each of the three minor thirds defined on the diatonic scale by lowering their bottom tones is equivalent to decreasing the corresponding major thirds and identifies the same chromatic tones.

There is yet a fourth minor third (one and a half diatonic steps) on the diatonic major scale. It lies between 2 and 4 and is implied from the derivation of the diatonic scale but not directly defined by it. It is a Pythagorean third ($^{32}/_{27}$), slightly less than $^{6}/_{5}$, the just minor third. Nevertheless, two additional chromatic tones can be identified by reasoning analogous to the derivation of the others. Expanding this (approximate) minor third downward to an exact major third identifies 2 flat and expanding it upward identifies 4 sharp (the term ***sharp*** being applied to raised tones). Note that 2 is flatted to preserve the "2,3,4" "third" identity while 4 is sharped to do the same. In this way all 12 of the approximately equal half steps implied in the diatonic major scale may be identified.

Reasoning along these lines can also give rise to what has become known as the ***diatonic minor scale***. Instead of building major triads upon the fundamental tonic, subdominant and dominant tones of the major scale, triads whose intervals are exchanged – major thirds above minor thirds rather than the other way around – are built. Such "inverted" triads are called ***minor triads***. Note that inverting a triad in this way leaves the lower and upper tones unchanged. The only difference is that the middle tones of each defining triad (the mediant, submediant and leading tone) are lowered a half step, changing the original major thirds to minor thirds and vice-versa. These minor triads and the seven distinct tones identified by them define the diatonic minor scale – 7 steps with the "minor" 3, 6 and 7 ½ step below (flats of) their "major" pitches.

The ***chromatic minor scale*** can be derived from reasoning similar to that used to derive the chromatic major scale. Here, however, defined minor thirds are raised to major thirds to produce 3 sharp, 6 sharp and 7 sharp. As before, the Pythagorean third between 2 and 4 produces 2 flat and 4 sharp when expanded downward or upward. In this way the same chromatic half steps as for the major scale are identified but under different names in cases defined by sharped minor thirds rather than flatted major thirds.

The harmonic ratios defined here, along with other relationships between and various naming of tones of the chromatic scale defined in this way, are summarized in a table below. This approach, historically identified as ***just*** (in the sense of "true" or "precise") ***intonation***, has the virtue of being harmonically "pure" but the severe drawback of requiring re-tuning when based on any tone other than the original tonic. As an example, the supertonic lies in the ratio of 9:8 to the tonic. If, however, the supertonic is now taken as a new tonic, then the next diatonic tone, the new supertonic, must be re-tuned from the original $^5/_4$ ($^{80}/_{64}$) to $^{81}/_{64}$ ($^9/_8$ x $^9/_8$).

Regrettably, any such attempts at "pure" intonation will fail challenges of modern music and, in particular, of fix-tuned (or fretted) instruments required to play equally well from any note as tonic (i.e., in any key). Some feel it is the other way around – that much music and instrumentation fail the challenges of pure intonation and harmony.

Measurement of a well-fretted guitar fingerboard will show that the ratios derived above for the subdominant (fourth), dominant (fifth) and octave may seem more or less precisely fretted but that others will not. The interval between a tonic and what is fretted as its mediant on a guitar is noticeably greater (the fretted distance smaller) than that of the just mediant. The resulting interval between the mediant and the dominant must therefore be less. This "practical" mediant is shifted upward, inevitably out of tune with the "pure" mediant. Consideration of this and similar issues is made worse by the fact that even in theory some tones are not uniquely defined by and do not fit neatly into the 12 tone scheme whose origin is suggested here.

Practically speaking, fix-tuned keyboard and fretted instruments are ***tempered*** by employing a constant multiple between successive tonal steps in place of the varying "ideal" ratios shown in the table. This multiple – not a ratio in the strict sense since it cannot be expressed exactly as a ratio of integers and therefore not harmonic – is the 12th root of two, slightly less than 1.06. The octave, produced by 12 applications of this multiple, is exactly twice the original. The "perfect fifth" so produced is close but not quite perfect – 0.11% low at 1.498 times the base frequency. The "imperfect fourth" is similar – 0.11% high at 1.335 times the base note. Other just intervals fare less well. The tempered major third, for example, is 0.79% sharp at 1.260 instead of 1.250. The tempered minor third is 0.9% flat. Such considerations can lead, if one is so inclined, to a study of harmony and of temperament, for which Bach's clavier became famous.

Consideration of intervals in terms of frequency ratios can be inconvenient, especially for non-harmonic intervals such as those arising from equal temperament, leading to multiples of long decimal fractions which may look very close together but sound very far apart. Identifying tones by letter or similar names is simpler but, as has been seen, imprecise at best. The system of *cents* was derived to address this.

The frequency of a tone varies exponentially as what is sensed as pitch varies linearly. The frequency of a unison is 2^0 (=1) times a base tone, the first octave is 2^1 times it, the second 2^2, etc. Because of this the cent is based upon the logarithm to the base 2 of the frequency ratio of an interval. The cent was devised and named to represent 1/100 of each of 12 equal subdivisions of an octave. For this reason the logarithm of the ratio is multiplied by 1200. If "C" represents a value in cents and "R" a ratio of two frequencies, then $C = 1200\log_2 R$ and $R = 2^{C/1200}$ (note that $\log_2 R = \log R/\log 2$). The table of intervals and scales appearing below includes rows showing just, Pythagorean and equally tempered intervals expressed in cents.

Tuning

It can be said, particularly with reference to the idea of temperament, that no typical European musical instrument is ever in tune. The open strings of the guitar in standard tuning are a case in point: they may be tuned from the bottom "E" up a 4th to "A," another 4th to "D," a 4th to "G," a major 3rd to "B" and a final 4th to the top "E." The problem with this is that the top "E" will be noticeably (more than 21 cents) flat if each interval is tuned "purely" from low "E" upward by using or listening for harmonics on the open strings. The guitar, however, commonly is tuned in this way with the result then informally tempered to suit the musician and the music being played.

Another approach to tuning might be called ***Pythagorean*** since it is based entirely on the perfect 4ths and 5ths of Pythagorean harmony. The lower 4ths are tuned as above but the major 3rd between "G" and "B" is ignored. "B" is tuned to a 5th above "E" and the top "E" to a 5th over "A." This will result in a Pythagorean (sharp) 3rd between "G" and "B" in an overall tuning within $^+/-$ 4 cents of tempered values. The worst of these, "G" and "B," may be tweaked upward and downward, respectively, to tempered tuning as perfect octaves of tones produced on the "A" string. This reduces the (equal-tempered) tuning error to +2 cents on the "E" strings and –2 cents on "D."

The standard tuning reference is A-440 – the A above middle C – which is the fourth harmonic of the A string, falling at the fifth fret of the guitar's high E string.

As a final comment on tuning, it has been said that the guitar and piano "don't sound good together." I do not find this to be true but one must remember that a piano is not easily re-tunable. In such (and all) situations one should tune not for theory or harmonic purity but to accompanying instruments and the music being played.

Intervals and Scales

interval name	uni-son	m2	M2/d3	A2/m3	M3/d4	A3/P4	A4/d5	P5/d6	A5/m6	M6/d7	A6/m7	M7	octave
degree name	tonic		super tonic	(minor mediant)	mediant	sub-dominant	tritone	dom-inant	(minor submed)	sub-mediant	subtonic	leading tone	tonic
degree number	1	2♭	2	3♭ (3)	3 (3♯)	4	4♯	5	6♭ (6)	6 (6♯)	7♭ (7)	7 (7♯)	8^{vo}
degree letter (C)	C	D♭	D	E♭	E	F	F♯	G	A♭	A	B♭	B	C
solfeggio	do	di / ra	re	ri / me	mi	fa	fi / se	so	si / le	la	li / te	ti	do
tonic ratio	1	16/15	9/8	6/5	5/4	4/3	45/32	3/2	8/5	5/3	9/5	15/8	2
step ratio	-	16/15	135/128	16/15	25/24	16/15	135/128	16/15	16/15	25/24	27/25	25/24	16/15
tones	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
cents	0	111.7	203.9	315.6	386.3	498.0	590.2	702.0	813.7	884.4	1017.6	1088.3	1200
Pythag.	0	90.2	203.9	294.1	407.8	498.0	588.3	702.0	792.2	905.9	996.1	1109.8	1200
equal	0	100	200	300	400	500	600	700	800	900	1000	1100	1200

A note is said to be ***diatonic*** if it lies on a given major (or related) scale. Those which do not are said to be ***non-diatonic, chromatic*** or, loosely speaking, ***"accidental."***

Regardless of how intervals are precisely defined or tuned they are measured from the lower of two notes to the higher and are called unisons, 2nds, ..., 7ths, 8vos (octaves) and beyond according to the inclusive number of ***degrees*** (diatonic letter or number names) they span.

An interval is said to be a ***major interval*** (M) if the upper note falls on the major scale whose tonic is the lower except that the unison, octave and 4ths and 5ths which do so are said to be ***perfect intervals*** (P). A ***minor***

interval (m) is a major interval reduced by a half tone. A perfect or minor interval reduced by a half tone is said to be a ***diminished interval*** (d). An ***augmented interval*** (A) is formed by increasing a major or perfect interval by a half tone.

An interval is said to be ***inverted*** when the upper note (degree) of the interval is lowered by an octave or the lower raised by an octave. Inverted perfect intervals are themselves perfect intervals while inverted major intervals become minor intervals, augmented become diminished and vice-versa. The sum of numeric degrees of an interval and its inversion is 9 while the sum of the spans of their tones is 6. A minor 2^{nd} (a span of ½ tone), for example, inverts to a major 7^{th} (5½ tones).

Various ***pentatonic (5 tone) scales*** may be constructed using major 2^{nd}s and minor 3^{rd}s or other selected intervals. ***Whole note scales*** (of 6 tones) may be built with major 2^{nd}s. Many other possibilities exist but dominant European melodic tradition is based on seven note diatonic scales built on major and minor 2^{nd}s and identified as ***modes*** as follows:

Ionian	MMmMMMm	(scales in the Ionian mode are called ***major scales***. Note that each
Dorian	MmMMMmM	of the following modes uses the same cycle of intervals starting on
Phrygian	mMMMmMM	respectively increasing degrees)
Lydian	MMMmMMm	
Mixolydian	MMmMMmM	
Aeolian	MmMMmMM	(scales in the Aeolian mode are called ***relative minor scales***)
Locrian	mMMmMMM	

Relative minor scales begin on the 6^{th} degree of the related major scale. A minor scale uses the exact (tempered) notes of the related major scale. The ***harmonic minor scale*** sharps the 7^{th} degree of the minor scale. The ***melodic minor scale*** sharps both the 6^{th} and 7^{th} degrees on the ascending scale but uses the natural 6^{th} and 7^{th} when descending. The 7^{th} is always sharped in the dominant triad of the minor mode.

The scales frequently used in flamenco often are called Phrygian but vary in a way similar to the melodic minor, with the 2^{nd} and 3^{rd} degrees sometimes sharped when ascending and the 3^{rd} always sharped in the "tonic" triad.

Major and Minor Key Signatures

(entries in angle brackets are enharmonic (tonally equivalent) keys not normally used;
sharps accumulate from left to right and flats from right to left)

sharps	0	1(F)	2(C)	3(G)	4(D)	5(A)	6(E)	<7(B)>	-	-	-	-
or flats	-	-	-	-	-	<7(F)>	<6(C)>	5(G)	4(D)	3(A)	2(E)	1(B)
major	C	G	D	A	E	B<C♭>	F♯<G♭>	<C♯>D♭	A♭	E♭	B♭	F
minor	A	E	B	F♯	C♯	G♯<A♭>	D♯<E♭>	<A♯>B♭	F	C	G	D

Notation

Enharmonic notes are those that are identical on an equally tempered scale and even, in some cases, on just (harmonic) scales but that may be written or ***"spelled"*** differently – C sharp and D flat, for example. Notes taken as enharmonic, however, may not be identical in their usage or even in their ideal pitches. In just intonation, for example, the 4^{th} degree and all the chromatic tones of the relative minor are slightly flat of the corresponding major pitches (e.g., "just" D in A minor falls below D in C major as does C sharp below D flat, etc.). Spelling conventions for chromatic notes have evolved for such reasons.

Spelling conventions differ not only for the major and minor modes of a scale, as mentioned above under **Derivation of the Scales**, but for most of the seven modes. A basic guideline for indentifying chromatics ("spelling") in a given mode is to name them so that each successively larger interval from the tonic of the mode is correctly identified as a minor, major, perfect or tritone interval as follows: m2, M2, m3, M3, P4, T, P5, m6, M6, m7 and M7.

Thus if the first diatonic interval in a mode is a major 2nd then then second degree of the scale is flatted to identify the minor 2nd that precedes it. But if the first diatonic interval is a minor 2nd then the second degree is sharped to identify the major 2nd that follows it. And so on. The tritone, "T," should always be identified as a 4th, sharped as required, to preserve the notion that it spans three full diatonic steps (not the two full plus two half steps implied by identifying it as a flatted 5th). The single exception to this is in the Locrian mode, where the diatonic fifth is the tritone.

It is worth emphasizing that, as one changes from mode to mode on a given scale (key), naming of the diatonic steps does not change but some of their just (ideal) harmonic definitions (intonations) do. Both naming *and* ideal intonation of some chromatic steps vary (within the same key signature). By contrast, however, just intonation of intervals on scales of differing modes but all beginning on the same tonic is identical, as is their naming (with the exception of the diatonic tritone of the Locrian mode, which is and is written as a fifth rather than a fourth as in all other modes).

A simple rule for remembering spelling conventions for various modes is that are there are always five chromatics starting with the tritone of the major (Ionian) scale and proceeding onward in 5ths. These are all sharps in the Phrygian (starting on step III of the Ionian scale) and Locrian (starting on step VII) modes. Thereafter the number of flats increases, replacing the enharmonic sharps, starting with the flat of the seventh diatonic of the Ionian scale replacing the sharped sixth in the Aeolian (VI or natural minor) mode and proceeding onward in 4ths – the flatted third diatonic replacing the sharped second in the Doric (II) mode, the flatted sixth replacing the sharped fifth in Mixolydian mode V, etc.

Thus, for example, the semitone between G and A would normally be written as A flat in the key of C major but as G sharp in A minor (Aeolian) as well as in the Phrygian and other modes of this key signature. The full results of this rule are summarized in the following table, showing the chromatic degrees of each mode.

MODE	**Chromatics**				
I – Ionian	2♭	3♭	4♯	6♭	7♭
II – Dorian	2♭	3♯	4♯	6♭	7♯
III – Phrygian	2♯	3♯	4♯	6♯	7♯
IV – Lydian	2♭	3♭	4♭	6♭	7♭
V – Mixolydian	2♭	3♭	4♯	6♭	7♯
VI – Aeolian	2♭	3♯	4♯	6♯	7♯
VII – Locrian	2♯	3♯	5♯	6♯	7♯

These spelling conventions apply identically in all key signatures. Natural, double flat and double sharp signs are used as necessary to flat or sharp diatonics already identified as flats or sharps in a given key signature.

Another (usually equivalent) way of looking at note spelling is based on harmonic intervals within the music. Two notes, for example, falling in the functional interval of a third apart normally would be written using sharps, flats or naturals as necessary so that they span three degrees (E – G sharp, not E – A flat). This can help in considering music which shifts temporarily from mode to mode while remaining in the same key signature. Such shifts are not always obvious but can reveal themselves in triads or other harmonies appearing in a given passage. Flamenco music, for example, falling basically in the Phrygian mode often digresses into the relative Aeolian (minor) and Ionian (major) modes. A sign of the latter would be the appearance of the C major triad and, often, the C7 chord. In the latter the 7 tone would be written as B flat, following the spelling rules of the major mode and also reflecting the harmonic definition of the C7 chord, rather than the A sharp of the predominant Phrygian mode.

Spelling conventions are widely ignored in practice, particularly in cases such as when the chromatic note written according to them would be bracketed by the diatonic note with the same letter name. The sequence A, A flat, A often will appear as A, G sharp, A. In cases where enharmonic substitution is made for such reasons it is common to propagate it in the immediate vicinity to minimize designating the same note in different ways.

Finally, note that music for the guitar is usually written using the treble clef but an octave high (played an octave low) for convenience in distributing the range of the instrument around the staff. Middle C, for example, is written within the staff lines rather than on the line below them, where it appears for the piano on the true treble clef. This is equivalent to saying that the clef used for the guitar is an octave below the true treble clef. A clef that is more correct and which sometimes appears in music for the guitar is a treble clef with a small "8" below it.

Triads and Chords

There are only three types of triads in the restricted sense of thirds over thirds using only diatonic tones – the ***major triad*** (a minor third over a major third), the ***minor triad*** (a major third over a minor third) and the ***diminished triad*** (a minor third over a minor third). There are three major and three minor triads on a diatonic scale. There is only one diminished triad (the VII or leading tone triad on the major scale). These are the basic chords of diatonic harmony. In the extended sense of groups of any three notes, there are other triads. Some of these are identified in the tables below.

Triads and Seventh Chords of the Harmonized Modal and Minor Scales

ROOT / MODE	**I tonic**	**II super-tonic**	**III mediant**	**IV sub-dominant**	**V dominant**	**VI sub-mediant**	**VII leading tone**
Ionian (major)	major M7	minor m7	minor m7	major M7	major 7	minor m7	diminished ø7
Dorian	minor m7	minor m7	major M7	major 7	minor m7	diminished ø7	major M7
Phrygian	minor m7	major M7	major 7	minor m7	diminished ø7	major M7	minor m7
Lydian	major M7	major 7	minor m7	diminished ø7	major M7	minor m7	minor m7
Mixolydian	major 7	minor m7	diminished ø7	major M7	minor m7	minor m7	major M7
Aeolian (nat. minor)	minor m7	diminished ø7	major M7	minor m7	minor m7	major M7	major 7
harmonic minor	minor mM7	diminished ø7	augmented M7+	minor m7	major 7	major M7	diminished °7
asc. melodic minor	minor mM7	minor m7	augmented M7+	major 7	major 7	diminished ø7	diminished ø7
Locrian	diminished ø7	major M7	minor m7	minor m7	major M7	major 7	minor m7

Chords of more than three notes (disregarding octaves) usually are identified by names more or less descriptive of the intervals comprising them. Naming of the "seventh" chords can be confusing, however. The most common of these is the ***dominant seventh***, often called simply the ***seventh***. It is the chord formed from adding not the 7^{th} (leading tone) but rather the minor (flatted) 7^{th} to a basic major triad. It and chords based upon it may be better seen (or at least their names better understood) as a VII (diminished) triad above the dominant (5^{th}) of a given major scale. Thus the (only) dominant seventh chord in the key of C major is B diminished (BDF) with G added as the root. The "true" seventh chord is distinguished from this by identification as the ***major seventh*** chord. The ***minor seventh*** chord is a minor triad to which the minor 7^{th} is added.

Inverted chords are formed by raising the root, root and third or root, third and fifth (in the case of chords of 4 notes) one octave. These are the ***1st, 2nd and 3rd inversions***, respectively. "Internal" inversions, such as raising the third of a triad an octave, are also possible and often required in fingering for the guitar. Root and inverted triads may be denoted by following a chord symbol with either a letter or numbers showing lower and outer intervals as follows:

root form: a or $^{5}_{3}$
1st inversion: b or $^{6}_{3}$
2nd inversion: c or $^{6}_{4}$

Definitions of the Basic Triads and some Extended Chords

CHORD NAME	SYMBOL	LOWER INT. OR CHORD	UPPER INT.	OUTER INT.	INTERVAL STRUCTURE
major triad	M or Maj	maj 3rd	min 3rd	perf 5th	I-III-V
minor triad	m or min	min 3rd	maj 3rd	perf 5th	I-♭III-V
diminished triad	^{o} or dim	min 3rd	min 3rd	dim 5th	I-♭III-♭V
suspended 4th triad	sus4	perf 4th	maj 2nd	perf 5th	I-IV-V
augmented triad	+ or aug	maj 3rd	maj 3rd	aug 5th	I-III-♯V
aug. (Italian) 6th	+6	maj 3rd	aug 4th	aug 6th	I-III-♯VI
minor 6th	m6	min triad	maj 2nd	maj 6th	I-♭III-V-VI
major 6th	6 or M6	maj triad	maj 2nd	maj 6th	I-III-V-VI
dominant 7th	7	maj triad	min 3rd	min 7th	I-III-V-♭VII
seven/six	7/6	partial M6	min 2nd	min 7th	I-III-VI-♭VII
dom 7th with susp 4th	7sus4	sus4 triad	min 3rd	min 7th	I-IV-V-♭VII
dom 7th with flat 5th	7-5	maj ♭5th triad	maj 3rd	min 7th	I-III-♭V-♭VII
major 7th	M7	maj triad	maj 3rd	maj 7th	I-III-V-VII
minor 7th	m7	min triad	min 3rd	min 7th	I-♭III-V-♭VII
minor major 7th	mM7 / m+7	min triad	maj 3rd	maj 7th	I-♭III-V-VII
half-diminished 7th	^{ø}7 / m7♭5	dim triad	maj 3rd	min 7th	I-♭III-♭V-♭VII
diminished 7th	^{o}7 / dim7	dim triad	min 3rd	dim 7th	I-♭III-♭V-𝄫VII
dom 7th augmented	7+	aug triad	dim 3rd	min 7th	I-III-♯V-♭VII
major 7th augmented	M7+	aug triad	min 3rd	maj 7th	I-III-♯V-VII
major added 9th	add9	maj triad	perf 5th	maj 9th	I-III-V-IX
major 9th	M9	M7	min 3rd	maj 9th	I-III-V-VII-IX
dominant 9th	9	7	maj 3rd	maj 9th	I-III-V-♭VII-IX
six/nine	6/9	M6	perf 4th	maj 9th	I-III-V-VI-IX
dom 9th with susp 4th	9sus4	7sus4	maj 3rd	maj 9th	I-IV-V-♭VII-IX
dom 7th with flat 9th	7-9	7	min 3rd	min 9th	I-III-V-♭VII-♭IX
minor added 9th	madd9	min triad	perf 5th	maj 9th	I-♭III-V-IX
minor 9th	m9	m7	maj 3rd	maj 9th	I-♭III-V-♭VII-IX
minor major 9th	mM9 / m+9	mM7	min 3rd	maj 9th	I-♭III-V-VII-IX
dominant 11th	11	9	min 3rd	maj 11th	I-III-V-♭VII-IX-XI
augmented 11th	+11	9	maj 3rd	aug 11th	I-III-V-♭VII-IX-♯XI
minor 11th	m11	m9	min 3rd	maj 11th	I-♭III-V-♭VII-IX-XI
dominant 13th	13	11	maj 3rd	maj 13th	I-III-V-♭VII-IX-XI-XIII
minor 13th	m13	m11	maj 3rd	maj 13th	I-♭III-V-♭VII-IX-XI-XIII

Measurement and Timing

Dominant European musical tradition divides music into ***measures*** whose rhythmic organization is identified by their ***time signature***. The scales of this volume are intended only to identify notes and fingering so no meaningful measurement has been applied to them. Understanding the mechanism, however, will be of use in music in general.

The basic convention of the musical measure is that it identifies a heavily accented group of pulses. One and only one heavy accent typically falls on the first pulse of a measure. The bottom number of a time signature specifies the note duration of each pulse – "2" for a half note, "4" for a quarter, etc. The top number indicates both the number of these pulses in a measure and also their accenting.

If the top number is divisible by two but not by three it indicates that accented pulses alternate with unaccented ones in groups of two. This is called ***duple meter***. Dividing that number by two gives the number of these groups of two in a measure.

If the number is divisible by three it represents ***triple meter***, indicating that two unaccented pulses follow each accented one in groups of three. Dividing it by three gives the number of these groups per measure.

If this number is equal to two or three it represents ***simple meter*** – with one accented group per measure. If it is greater than three but divisible either by two or three it represents ***compound meter*** – with two or more accented groups per measure.

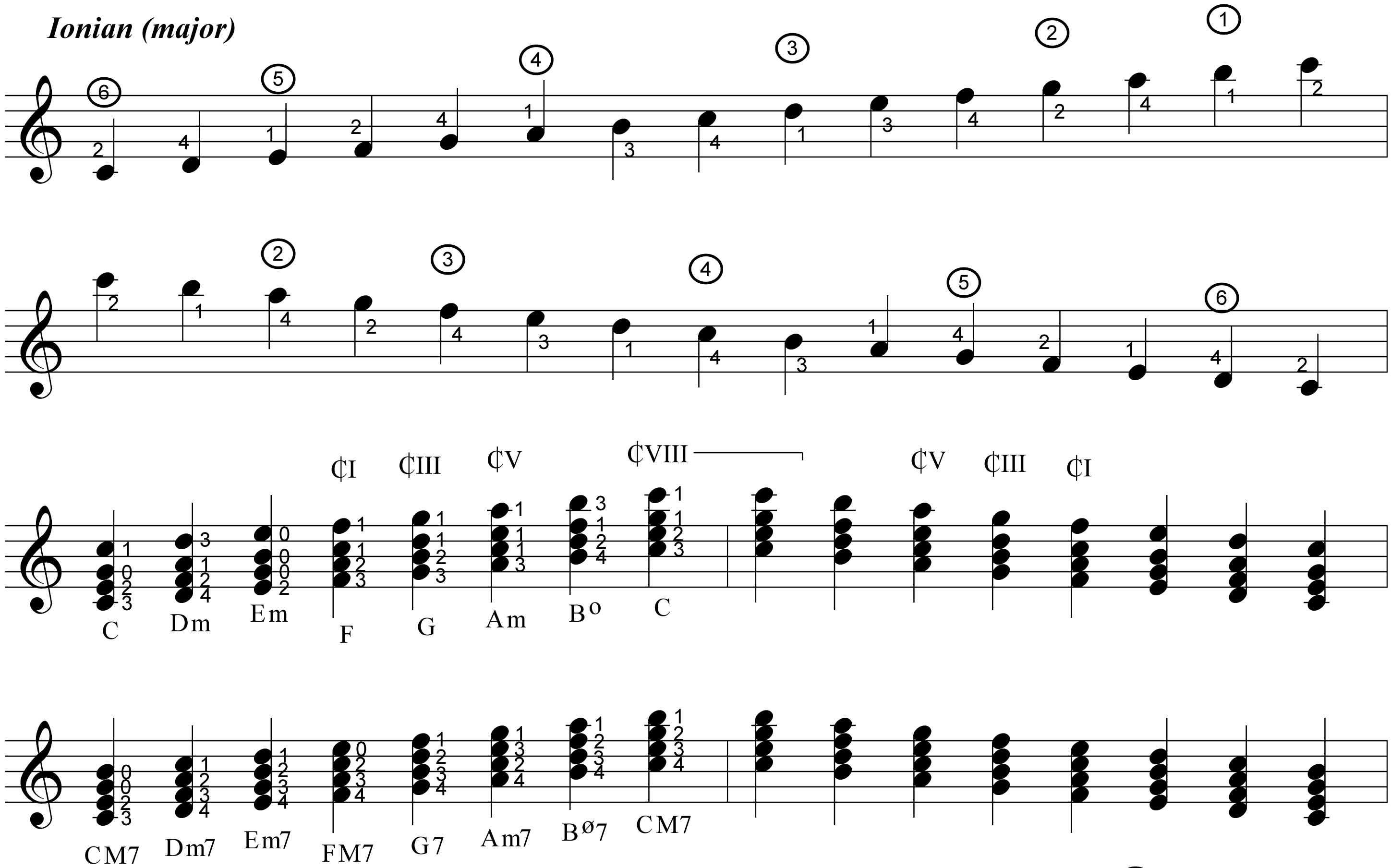
In compound meters the first pulse is accented more heavily than the accented pulses that follow it in the measure. Thus ${}^{2}{}_{4}$ time may be counted as ONE two, ONE two, etc. and ${}^{3}{}_{4}$ time as ONE two three, ONE two three while ${}^{4}{}_{4}$ time would be counted as ONE two three four and ${}^{6}{}_{4}$ as ONE two three four five six – with emphasis on the respective "three" and "four" but less than on the "one."

Music may be accented in groups of other than two or three pulses. This may or may not lead to time signatures not divisible by two or three. Accenting and grouping of pulses in such cases probably is best specified with explicitly written compound time signatures – " ${}^{3}{}_{8} + {}^{2}{}_{8} + {}^{2}{}_{8}$," for example, rather than " ${}^{7}{}_{8}$ " – unless simple meter (one accent per measure) actually is intended.

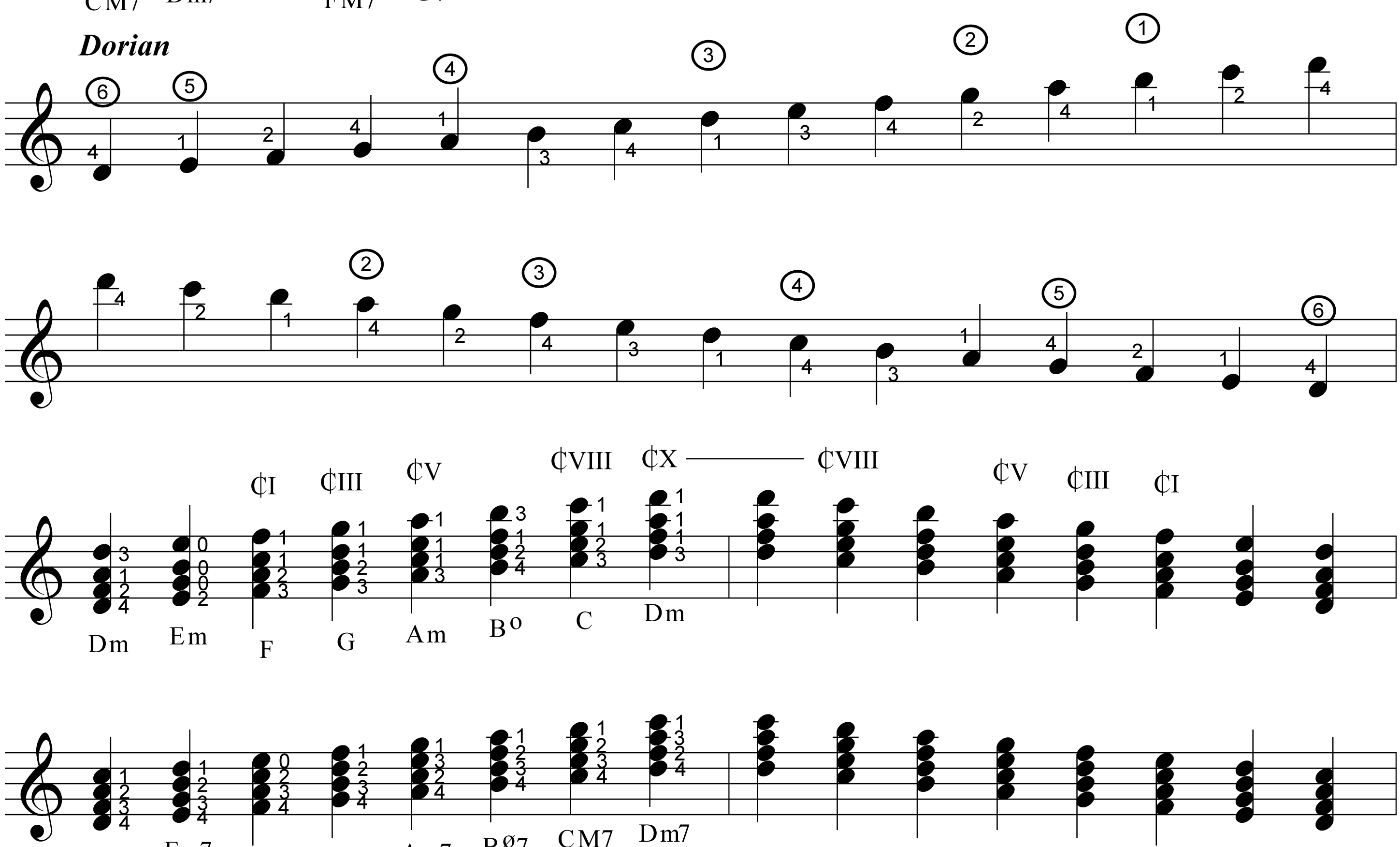
In any case, ***beaming*** – connecting flagged (eighth and shorter) notes with more or less horizontal lines – usually is applied to be consistent with and to emphasize time signature. A common practice is to beam pulse duration in simple and duple meters but the accented group in compound meters other than duple.

Modal and Minor Scales (natural)

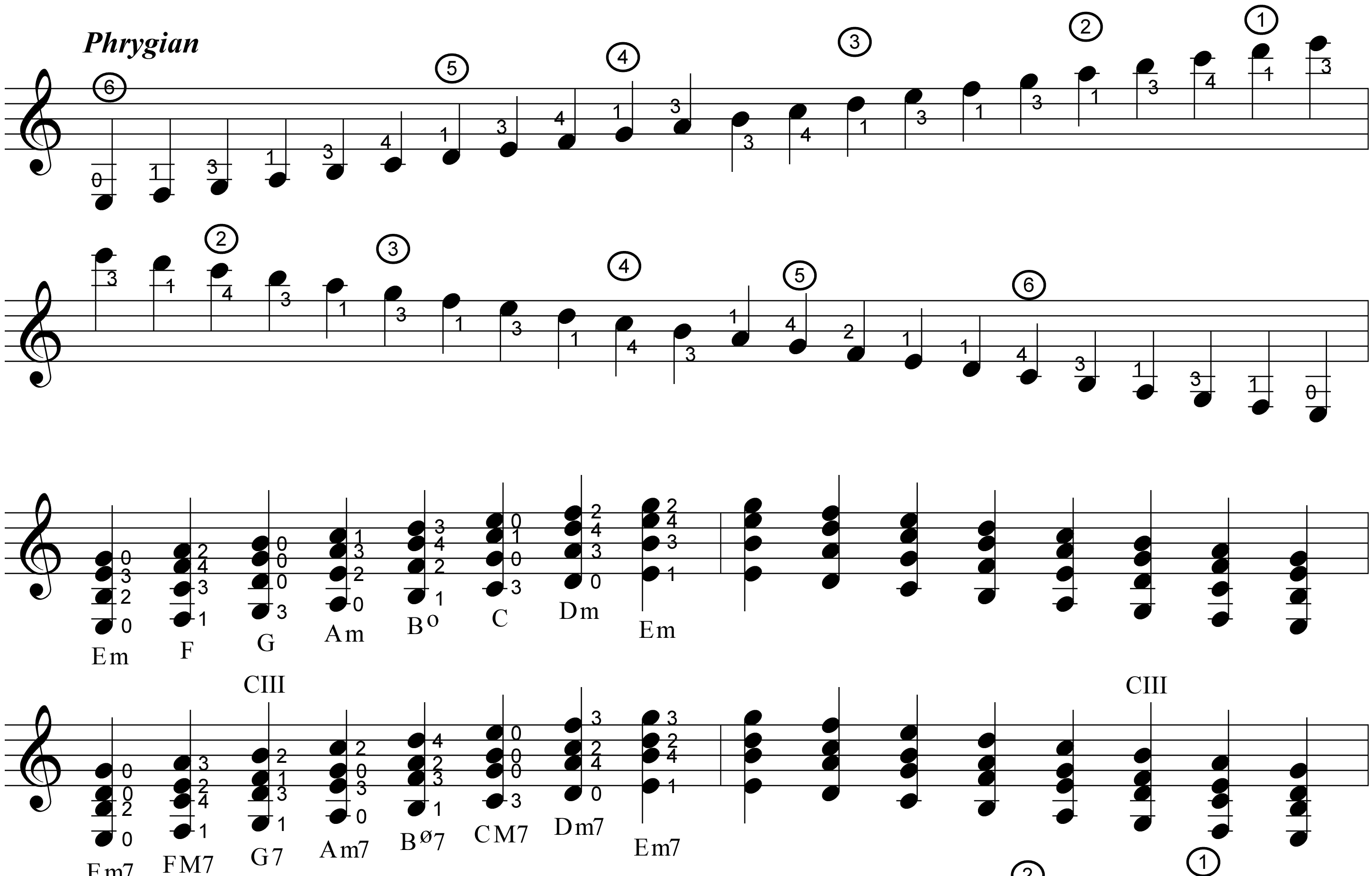
Ionian (major)



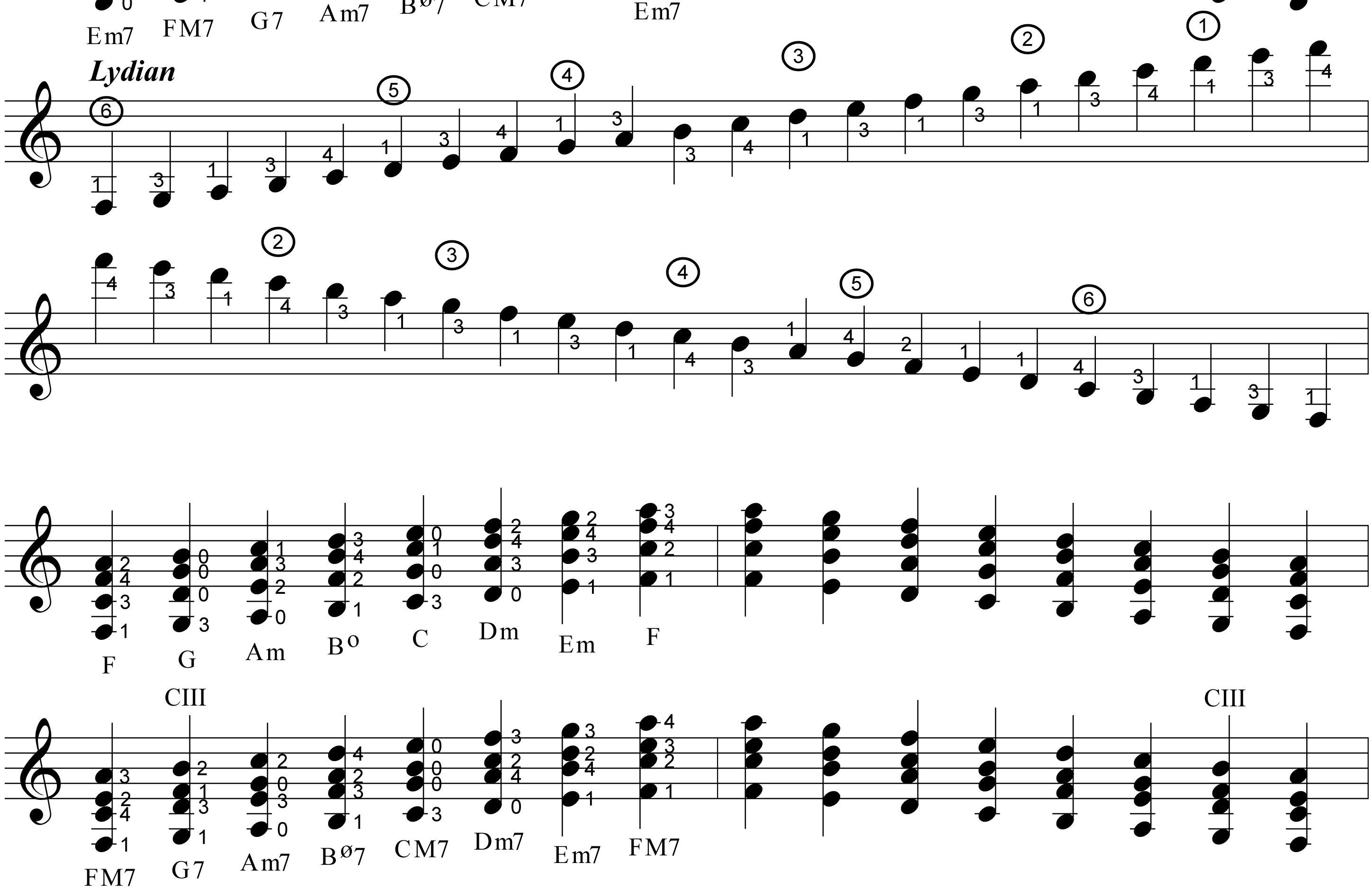
Dorian



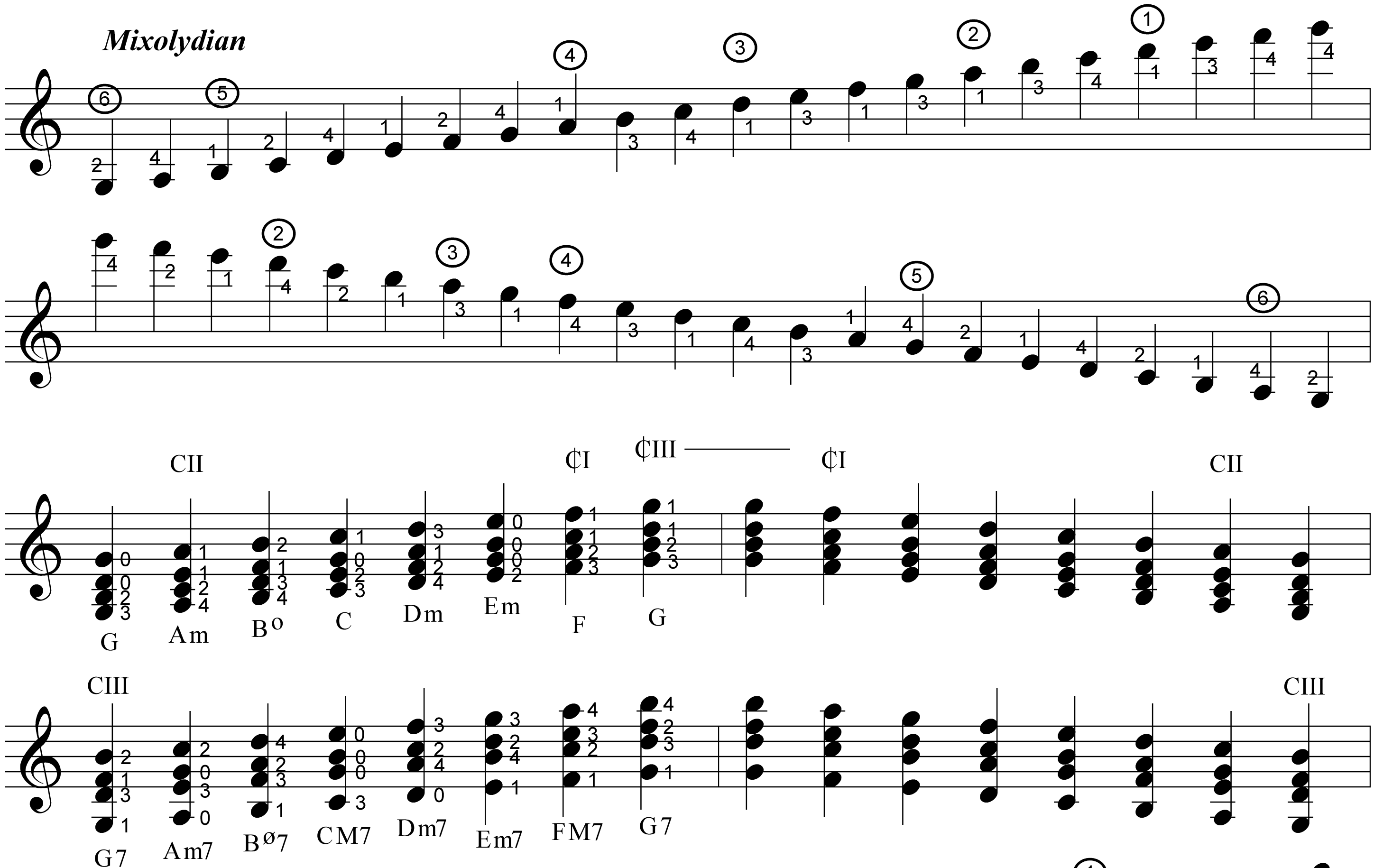
Phrygian



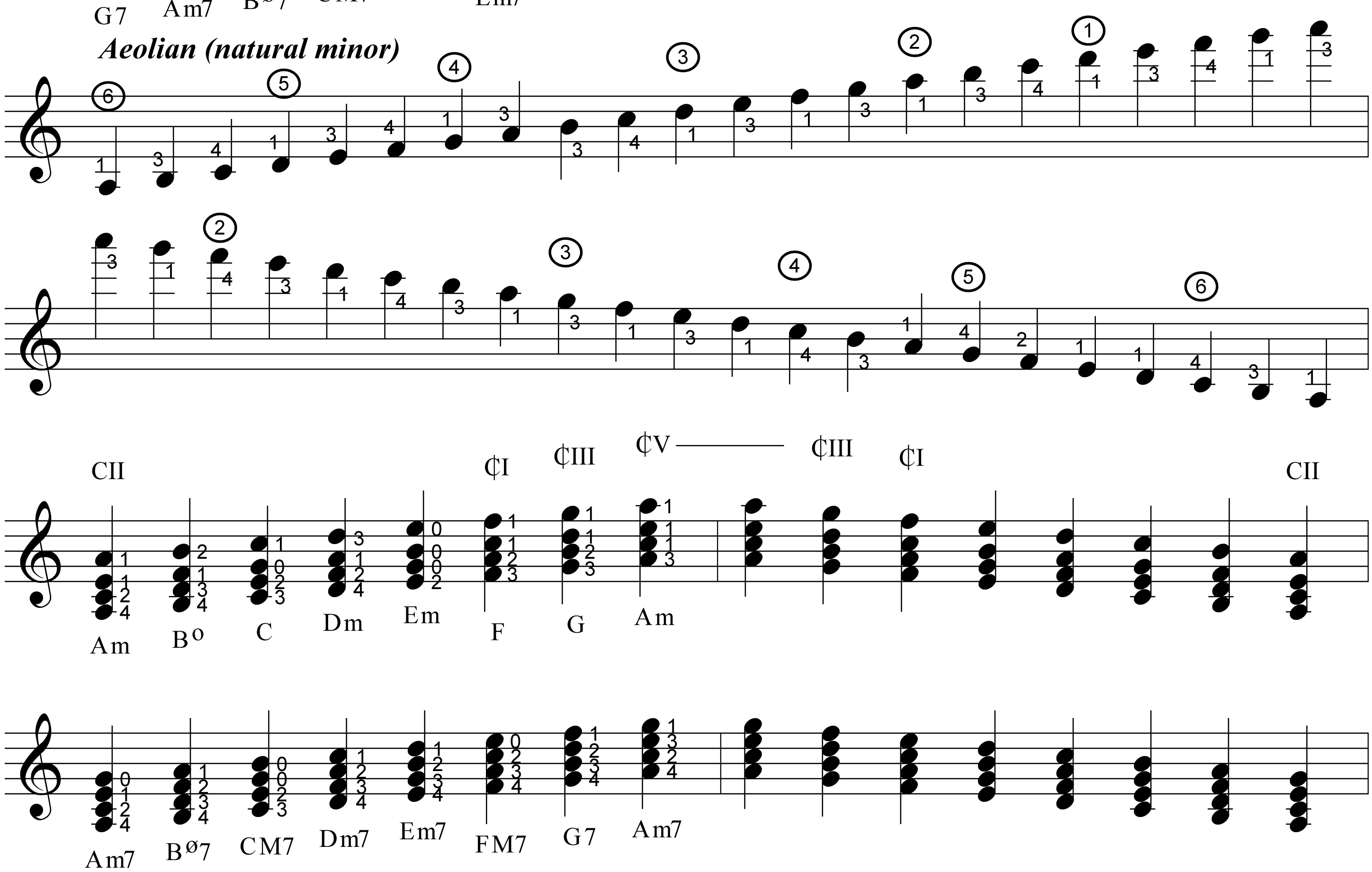
Lydian



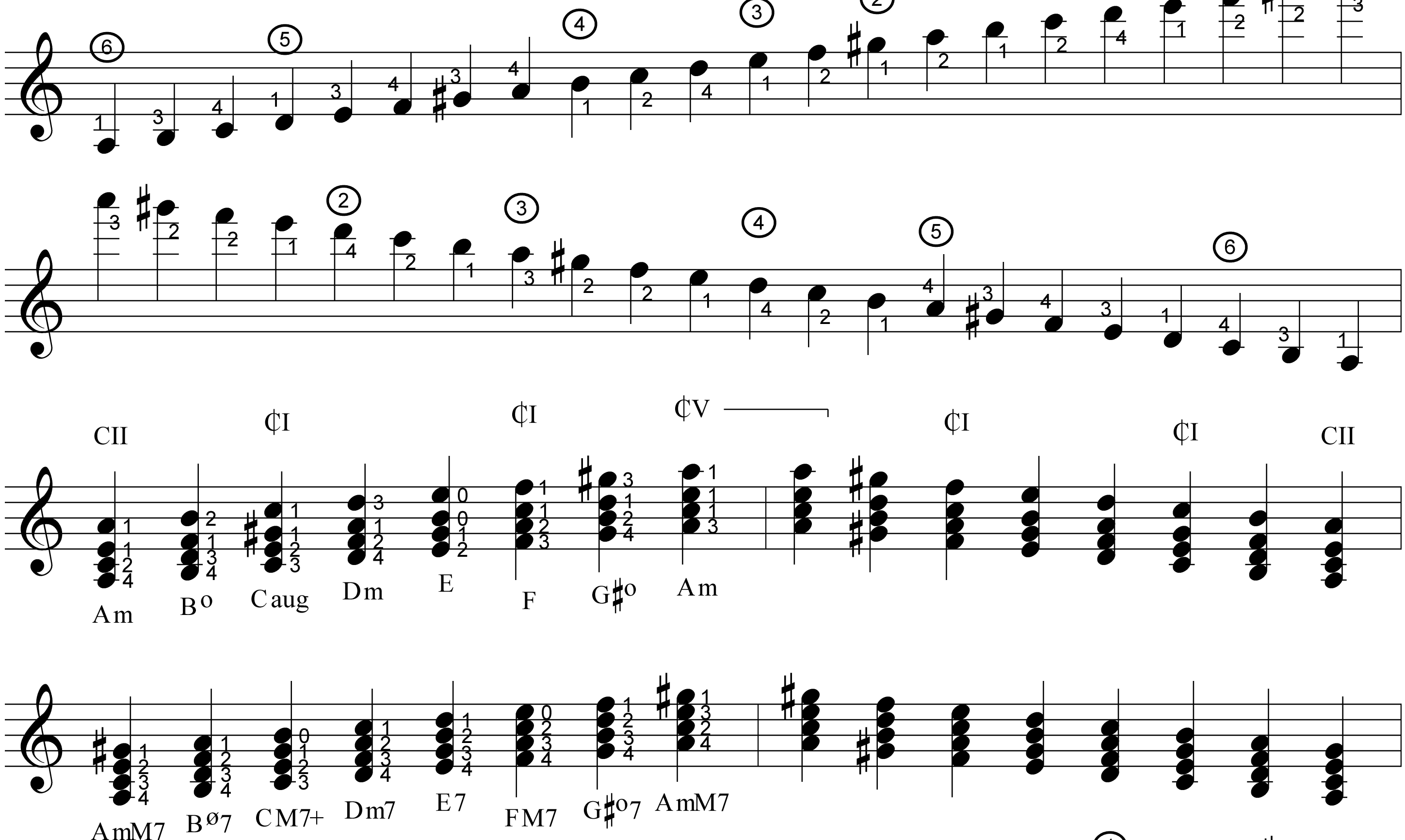
Mixolydian



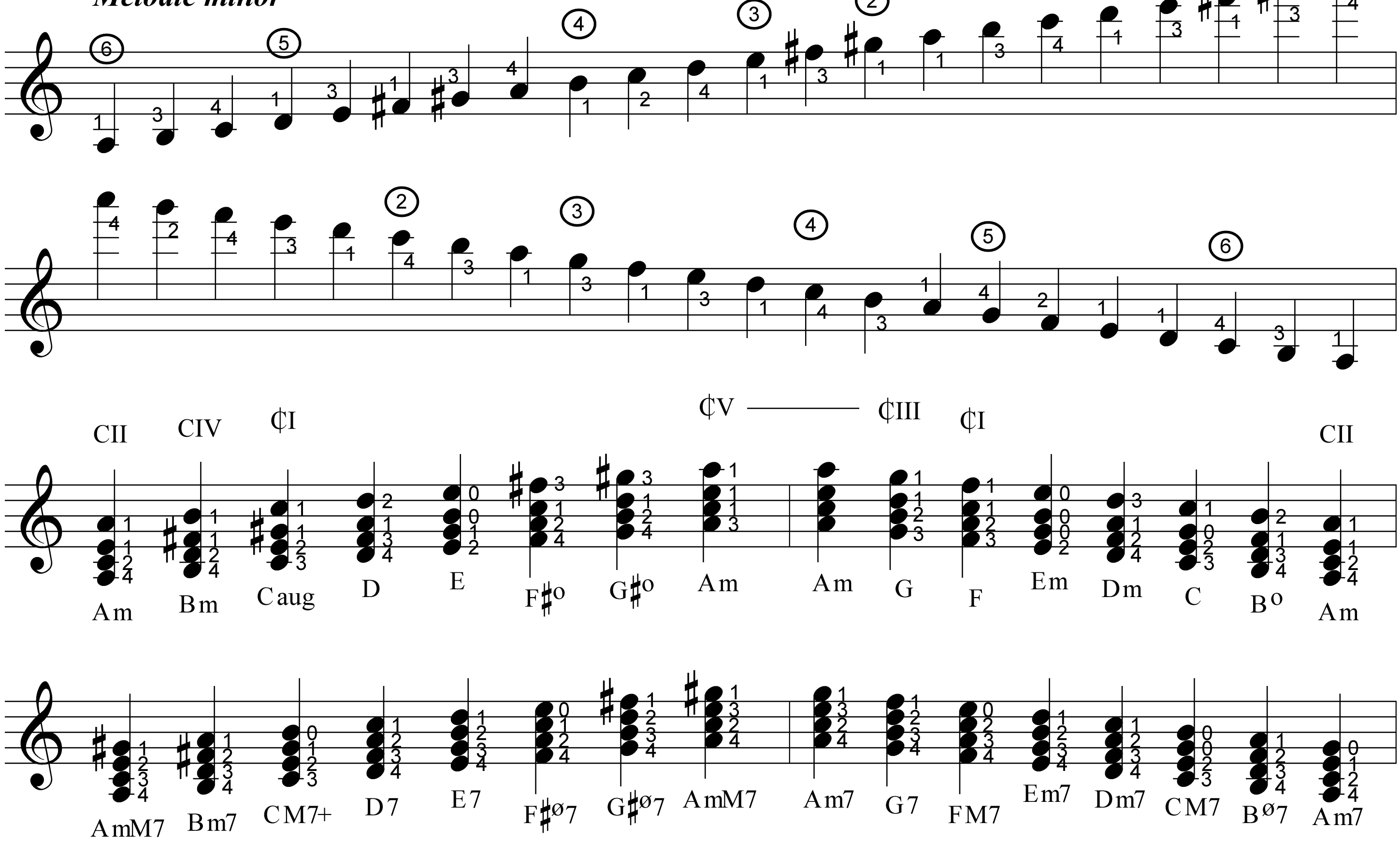
Aeolian (natural minor)



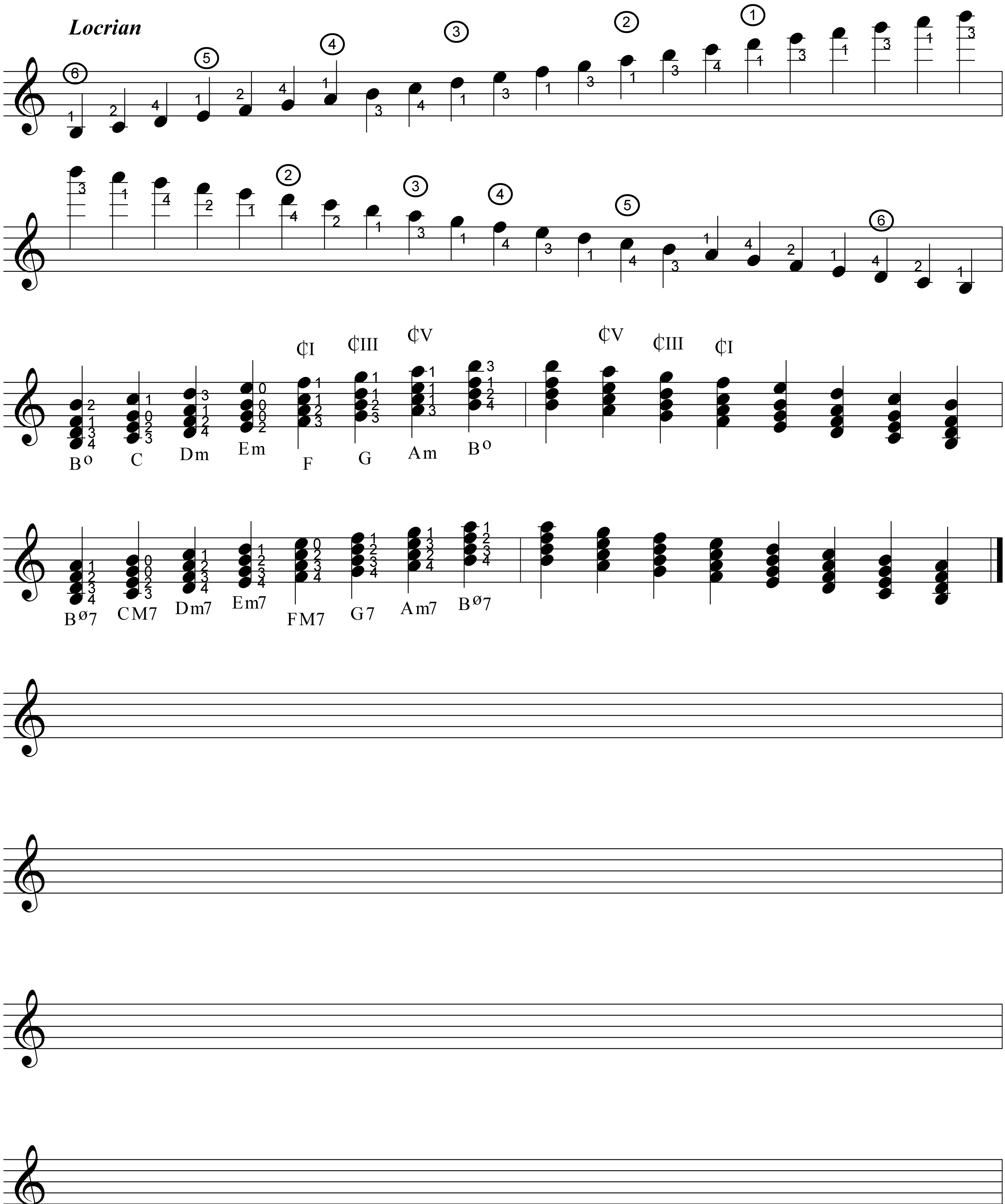
Harmonic minor



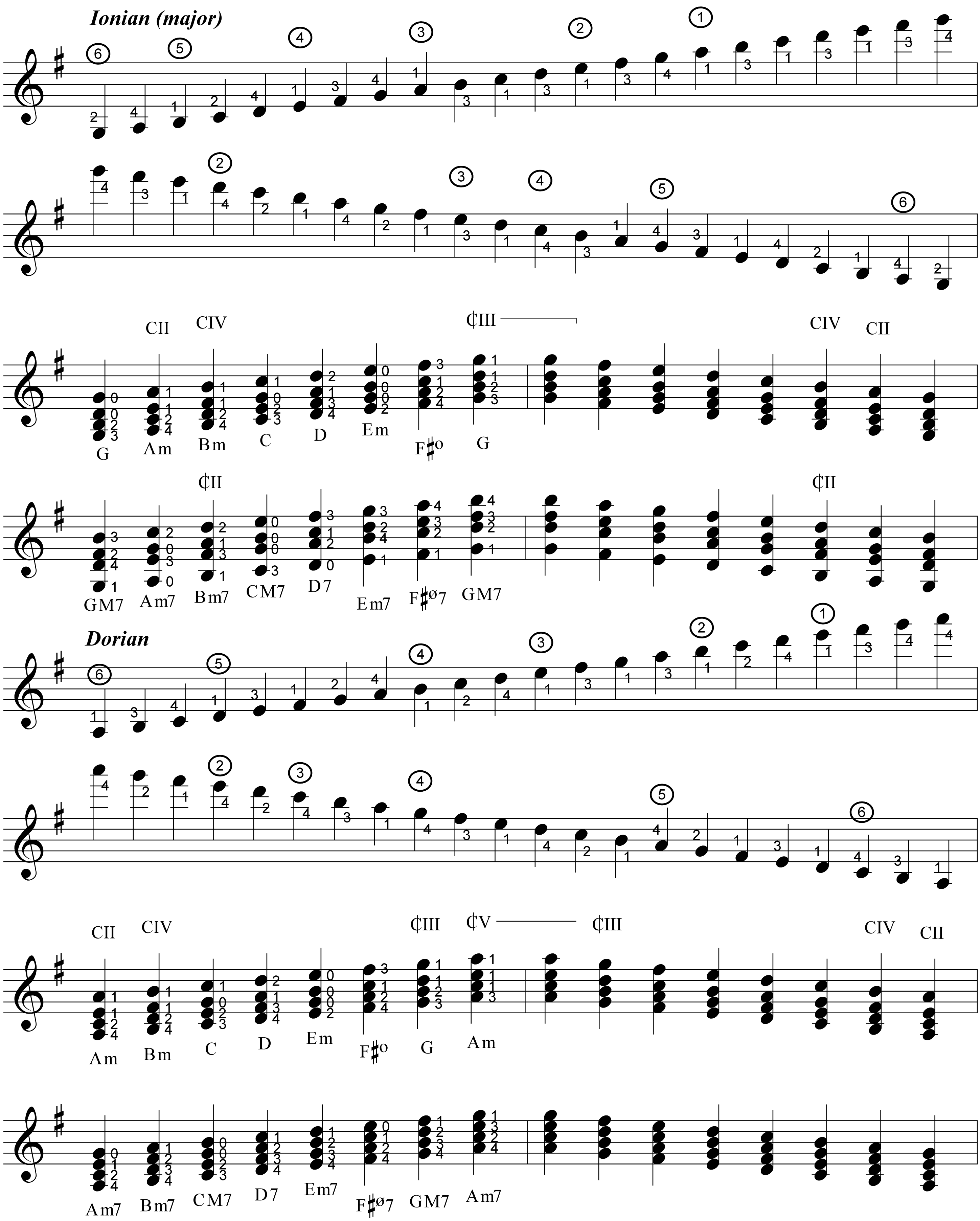
Melodic minor



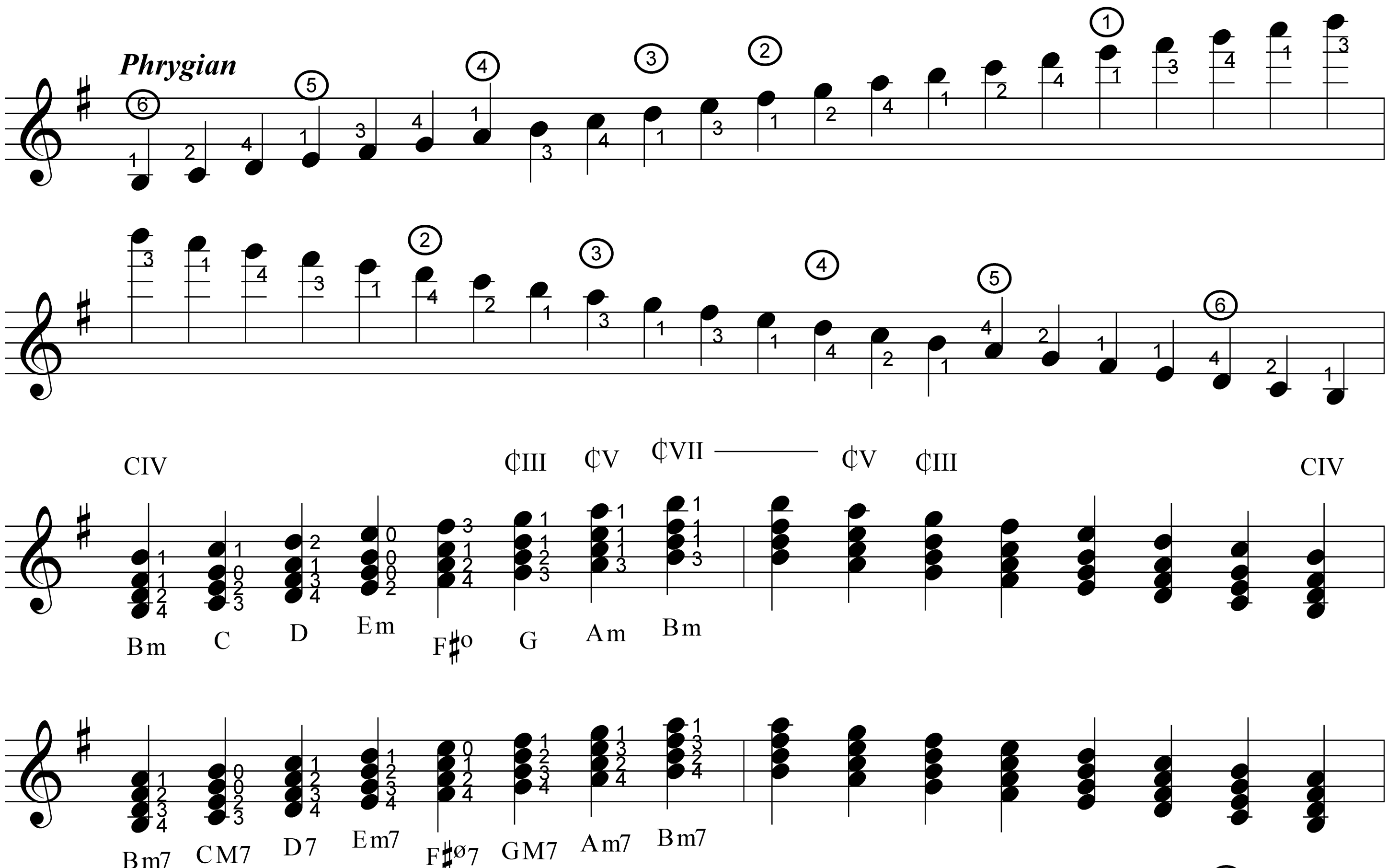
Locrian



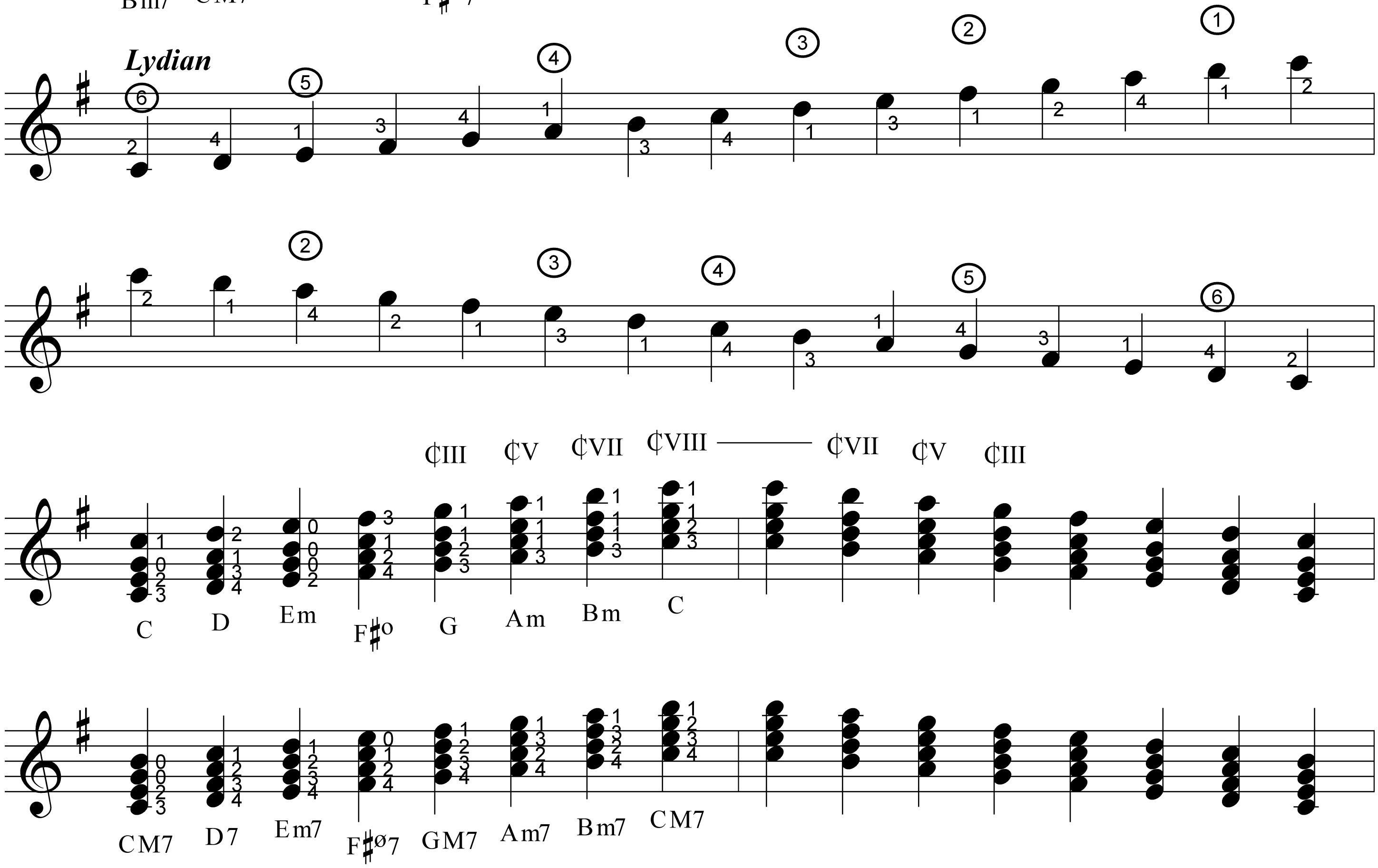
Modal and Minor Scales (one sharp)



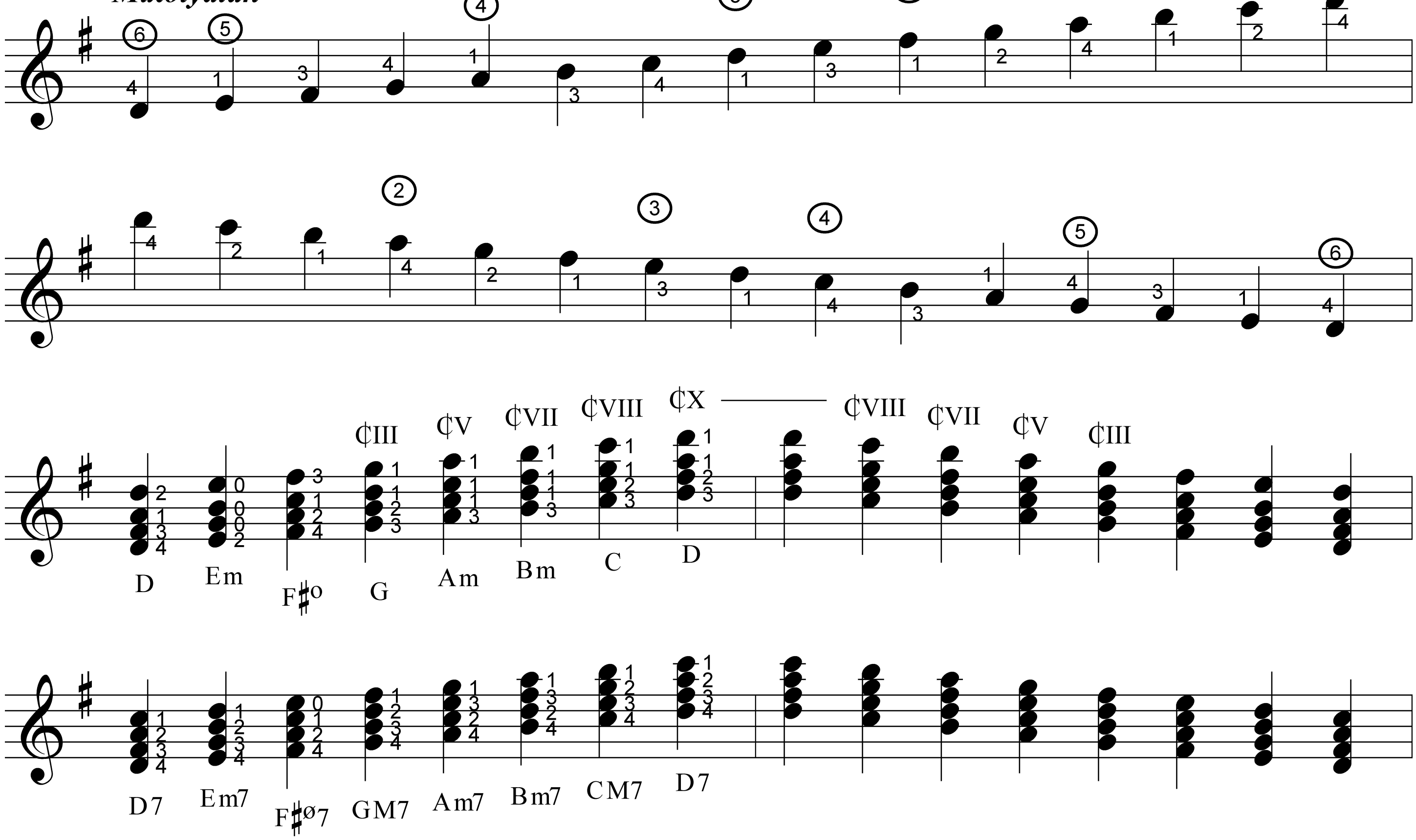
Phrygian



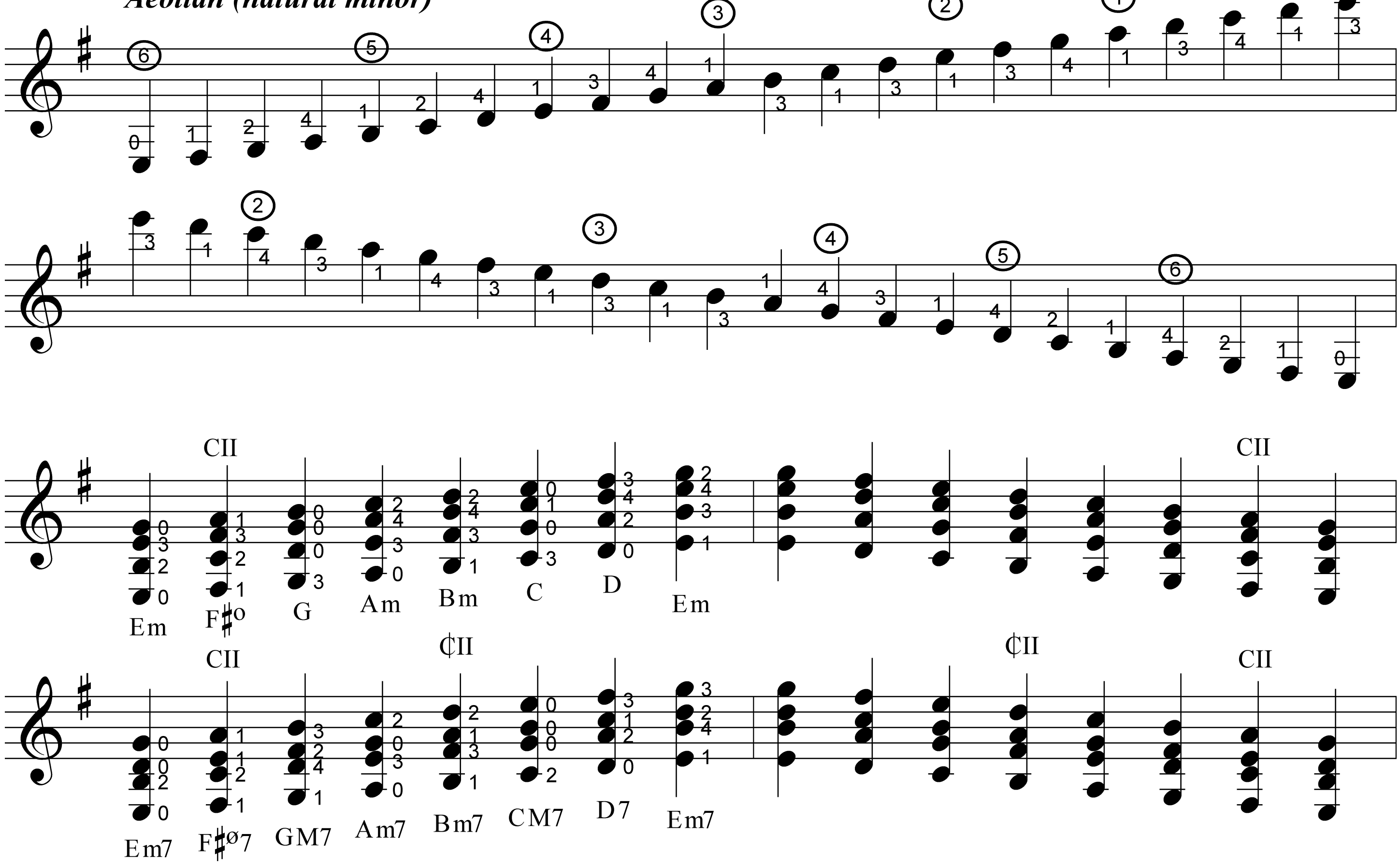
Lydian

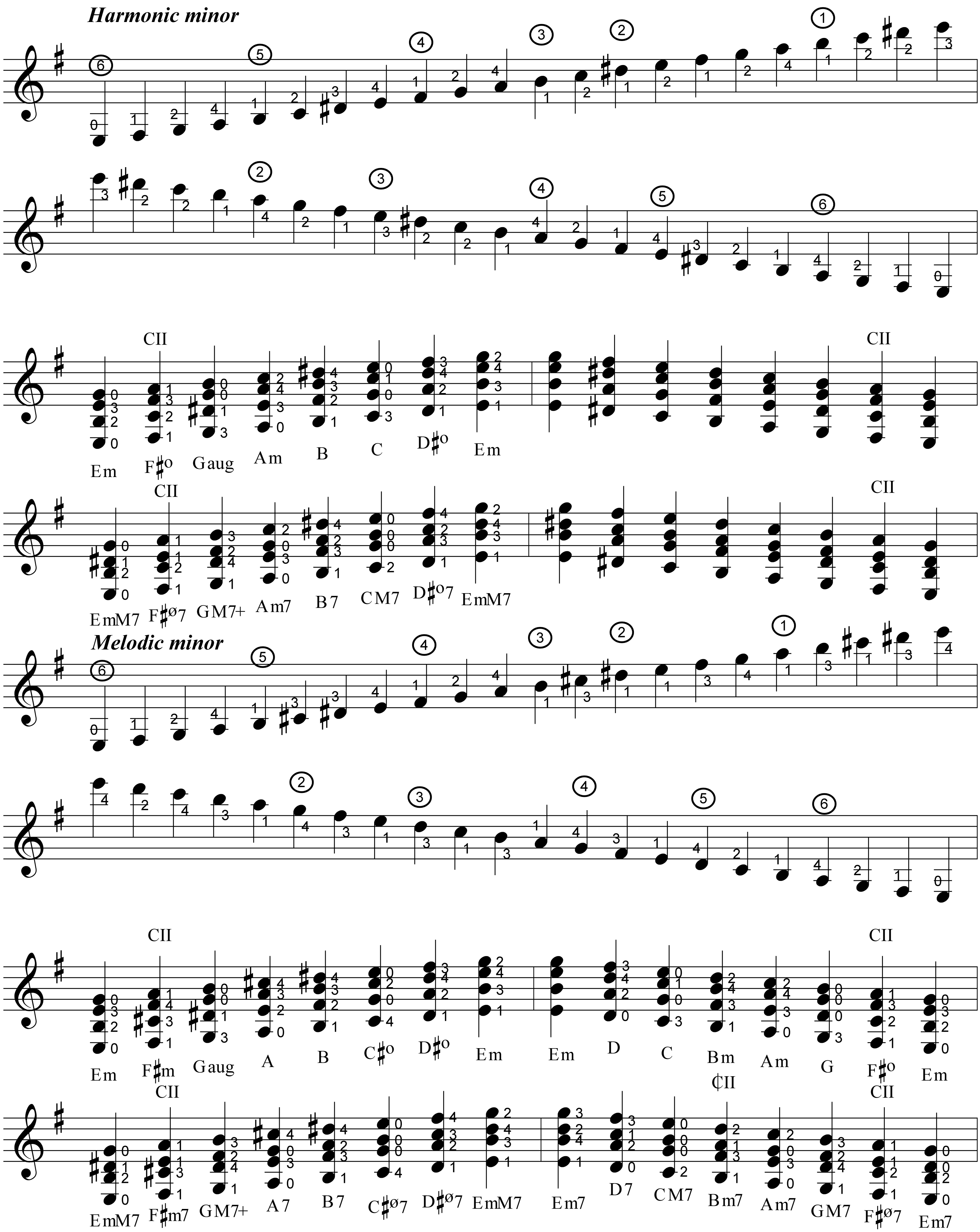


Mixolydian

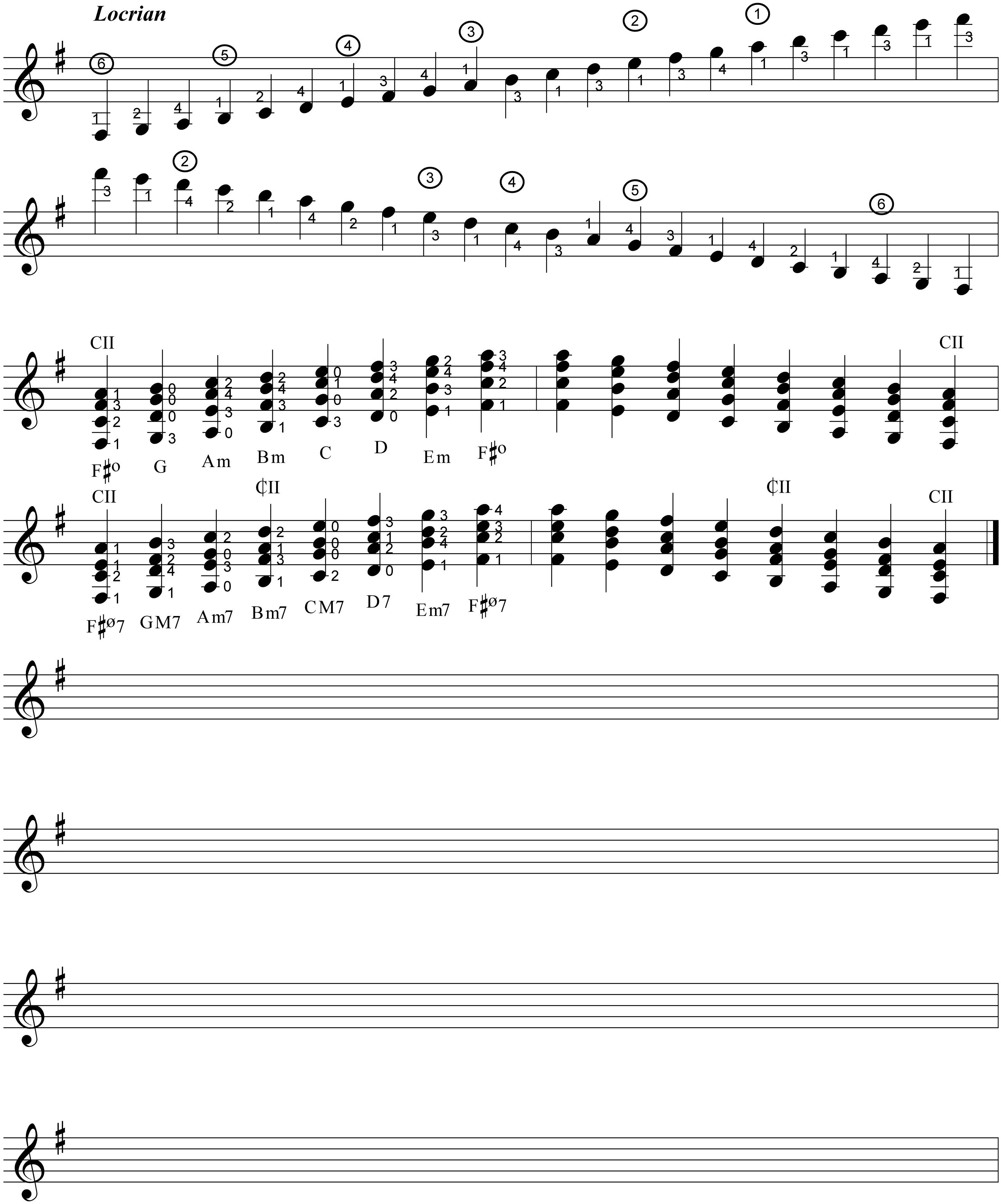


Aeolian (natural minor)

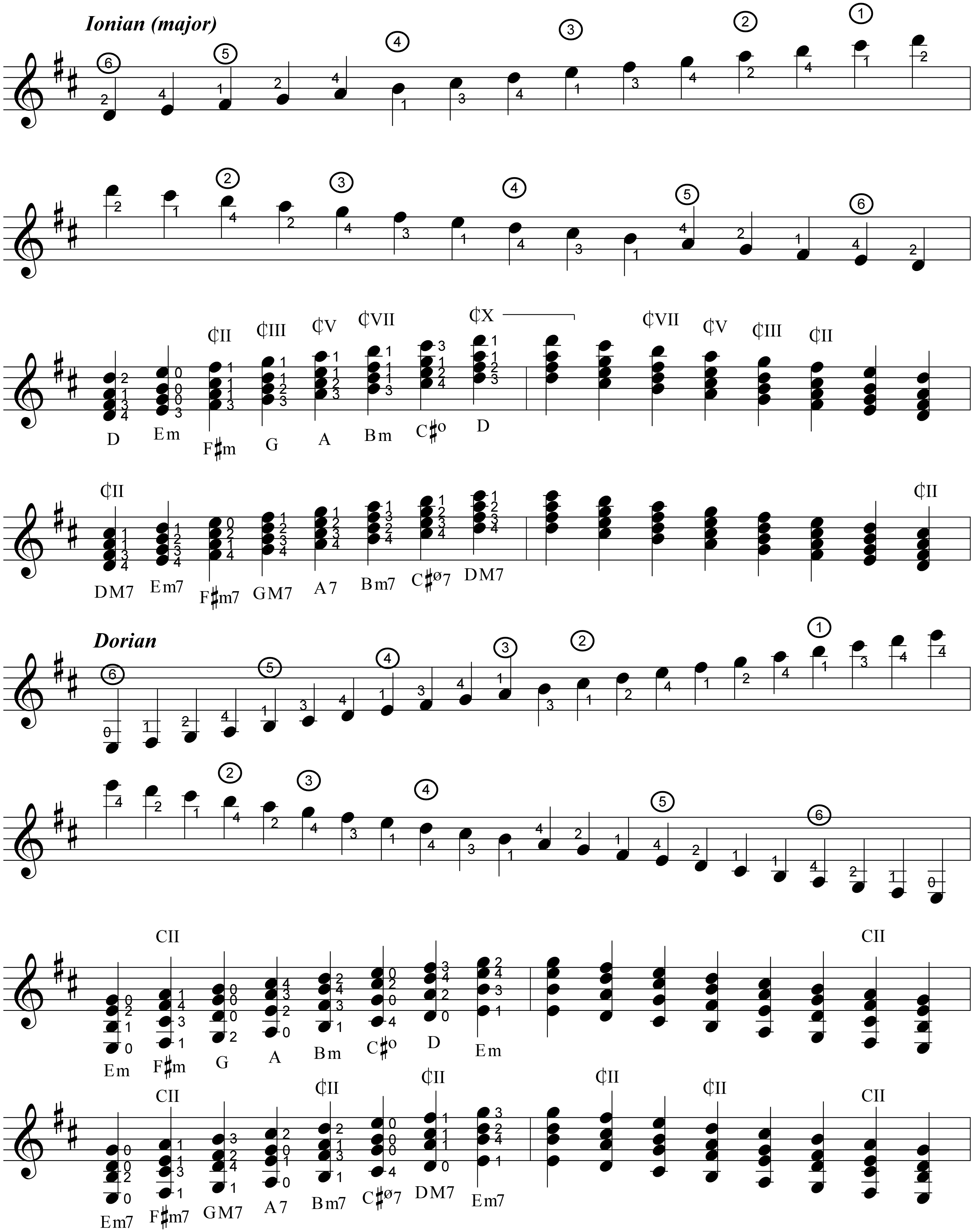


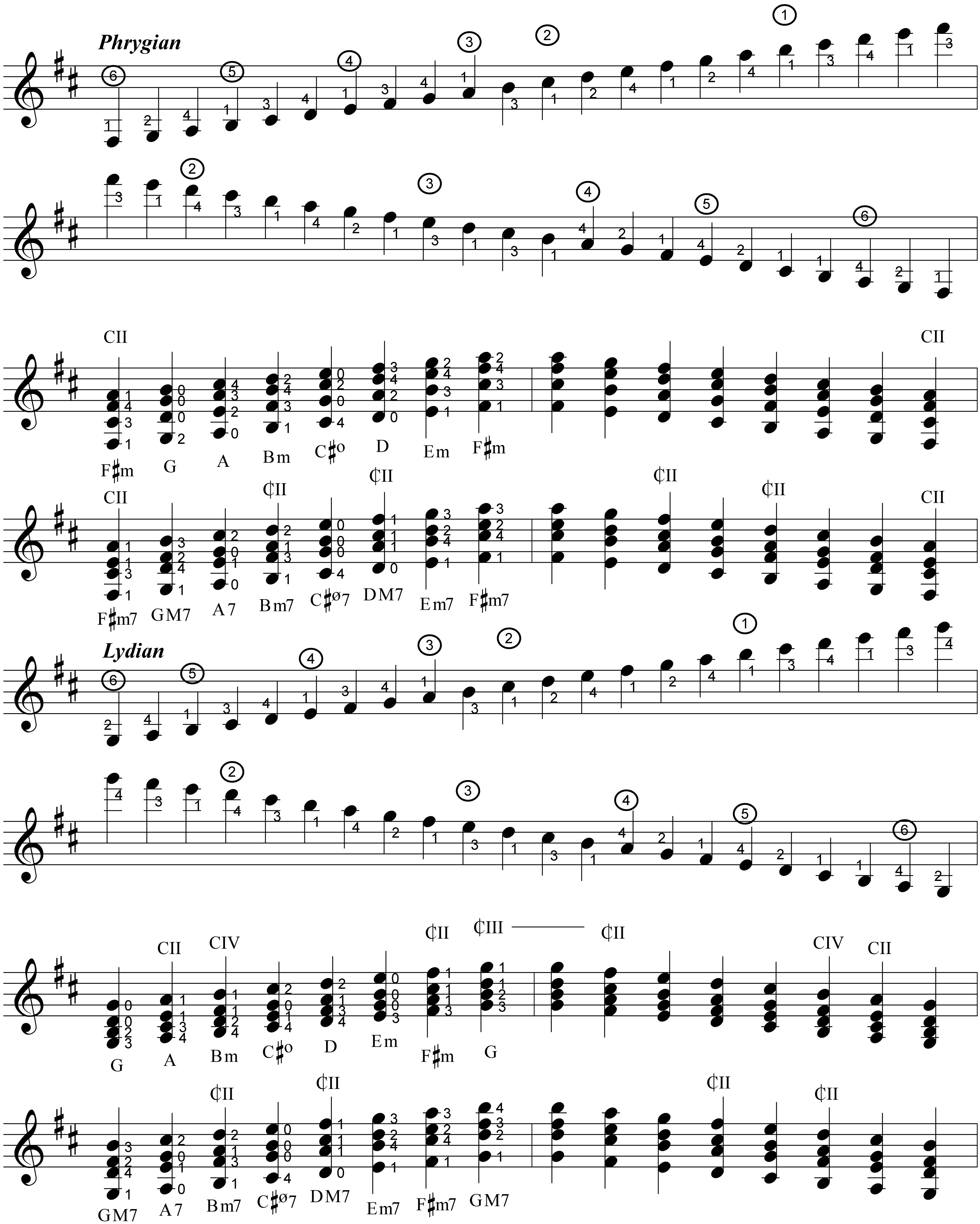

Harmonic minor
CII
CII
Em F♯o Gaug Am B C D♯o Em
CII
CII
EmM7 F♯ø7 GM7+ Am7 B7 CM7 D♯o7 EmM7
Melodic minor
CII
CII
Em F♯m Gaug A B C♯o D♯o Em Em D C Bm Am G F♯o Em
₵II
CII
CII
EmM7 F♯m7 GM7+ A7 B7 C♯ø7 D♯ø7 EmM7 Em7 D7 CM7 Bm7 Am7 GM7 F♯ø7 Em7

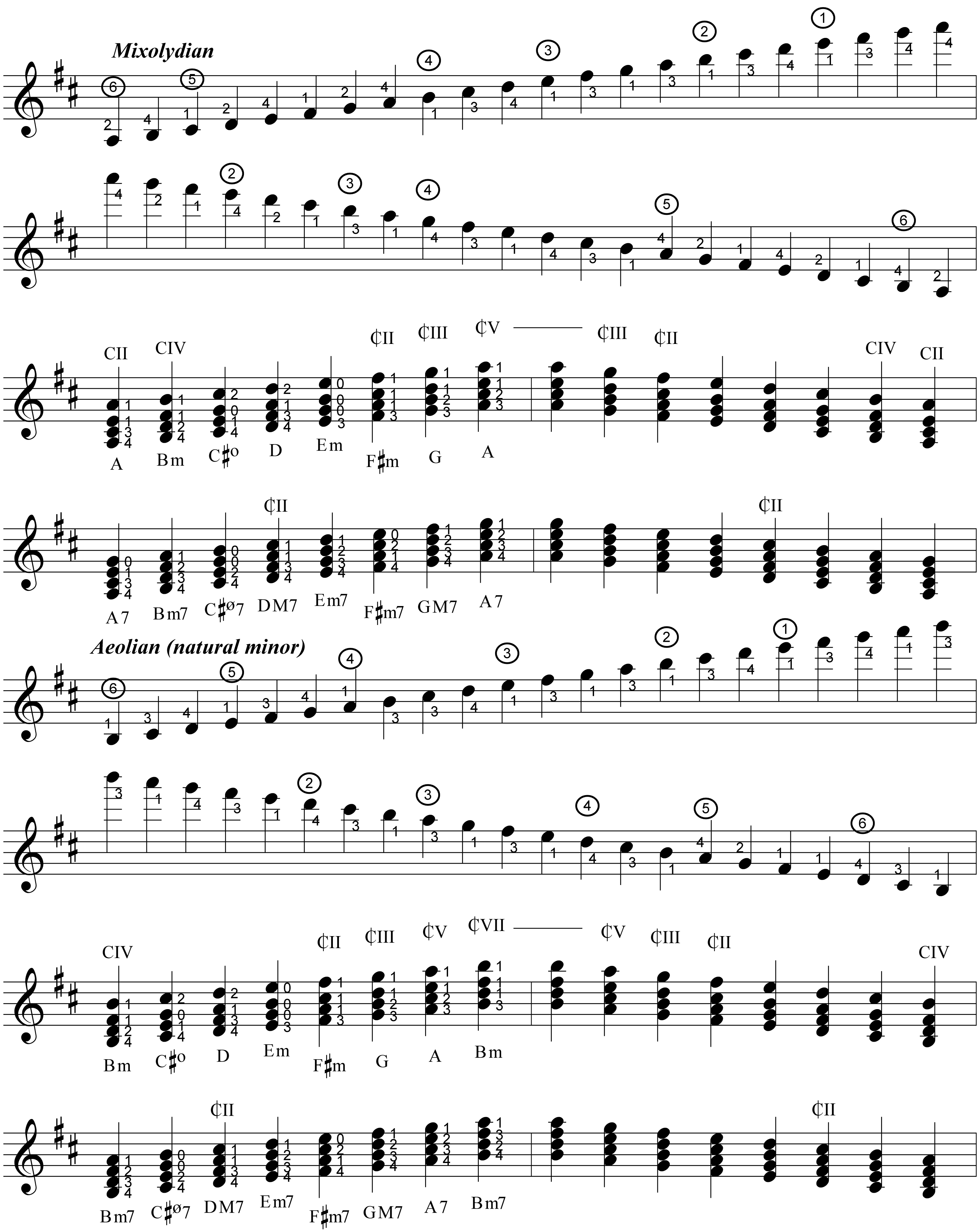
Locrian


CII
F♯o G Am Bm C D Em F♯o
CII
CII ₵II
F♯ø7 GM7 Am7 Bm7 CM7 D7 Em7 F♯ø7
₵II
CII

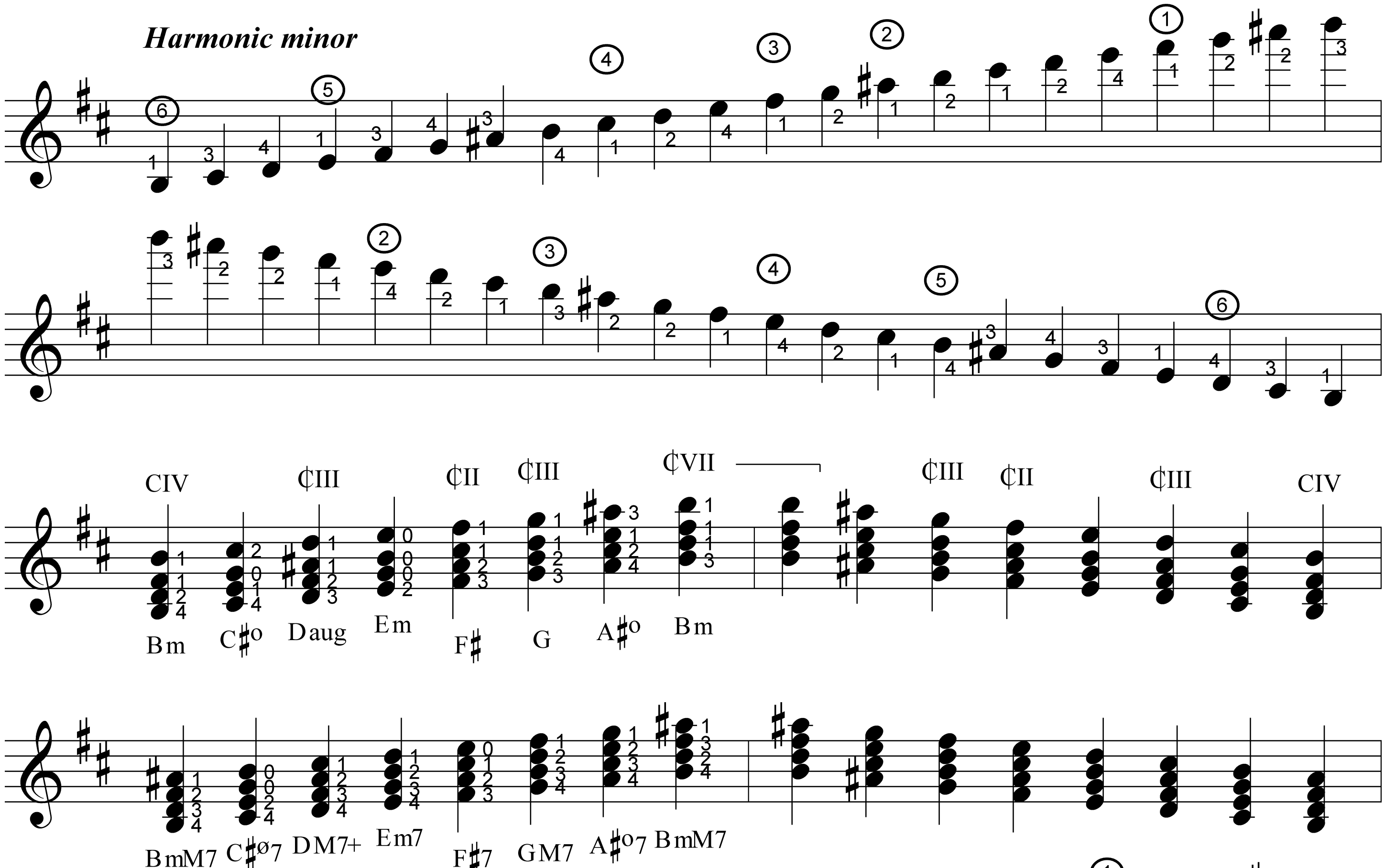
Modal and Minor Scales (two sharps)



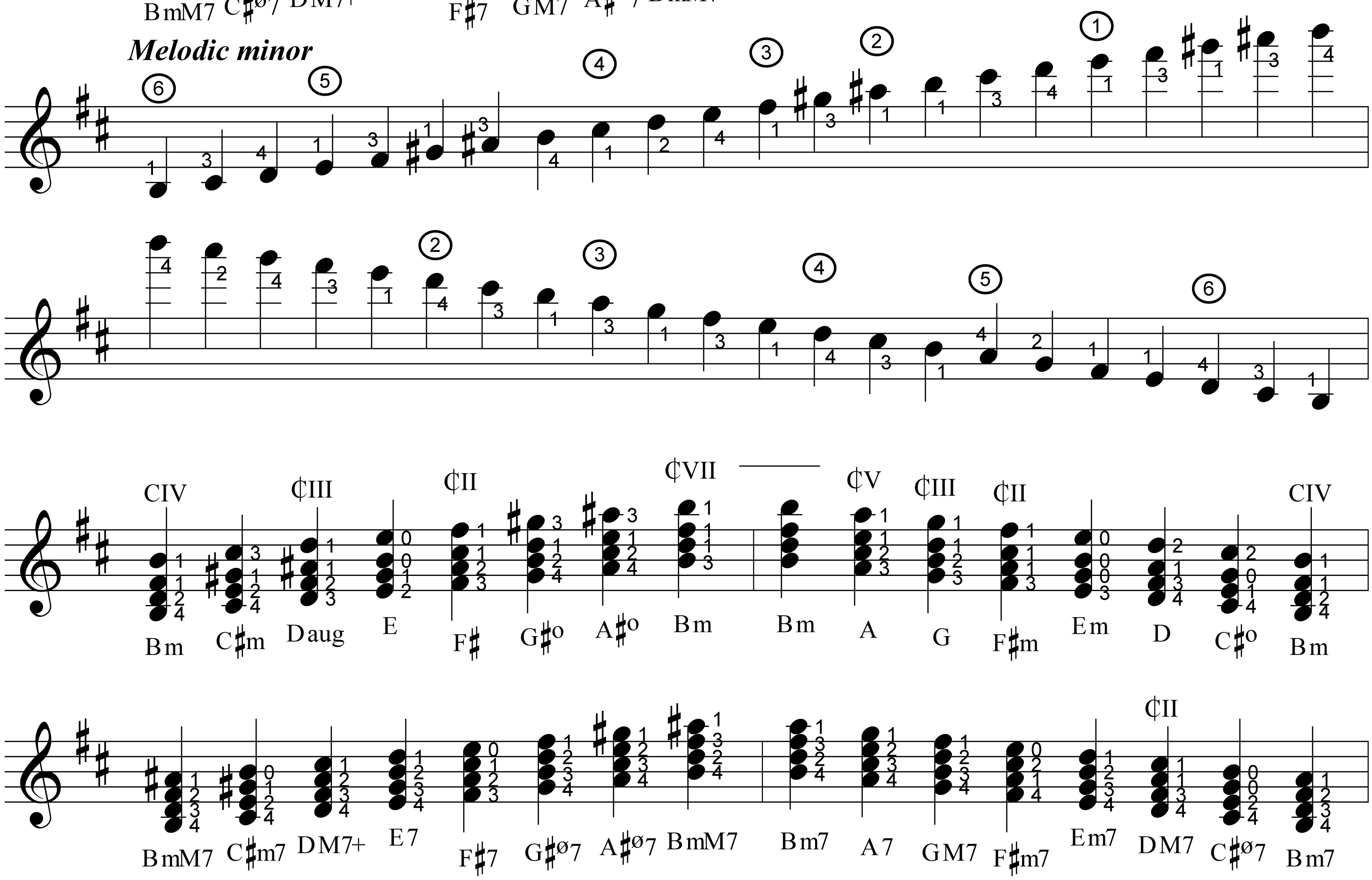

Phrygian
CII
F♯m G A Bm C♯o D Em F♯m
CII
CII ₵II ₵II ₵II ₵II CII
F♯m7 GM7 A7 Bm7 C♯ø7 DM7 Em7 F♯m7
Lydian
CII CIV ₵II ₵III ₵II CIV CII
G A Bm C♯o D Em F♯m G
₵II ₵II ₵II ₵II
GM7 A7 Bm7 C♯ø7 DM7 Em7 F♯m7 GM7


Mixolydian
CII CIV ₵II ₵III ₵V ₵III ₵II CIV CII
A Bm C♯o D Em F♯m G A
₵II ₵II
A7 Bm7 C♯ø7 DM7 Em7 F♯m7 GM7 A7
Aeolian (natural minor)
CIV ₵II ₵III ₵V ₵VII ₵V ₵III ₵II CIV
Bm C♯o D Em F♯m G A Bm
₵II ₵II
Bm7 C♯ø7 DM7 Em7 F♯m7 GM7 A7 Bm7

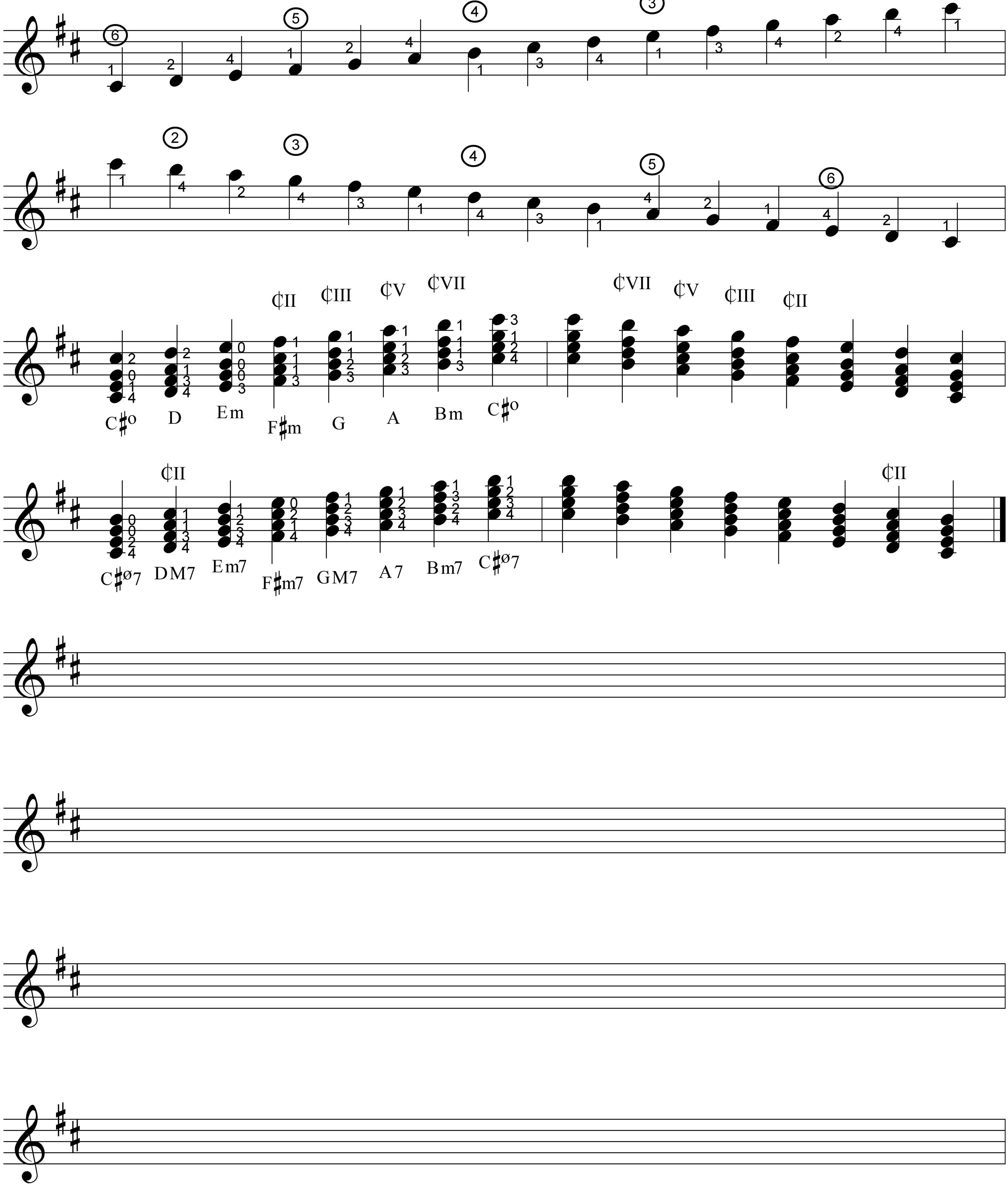
Harmonic minor



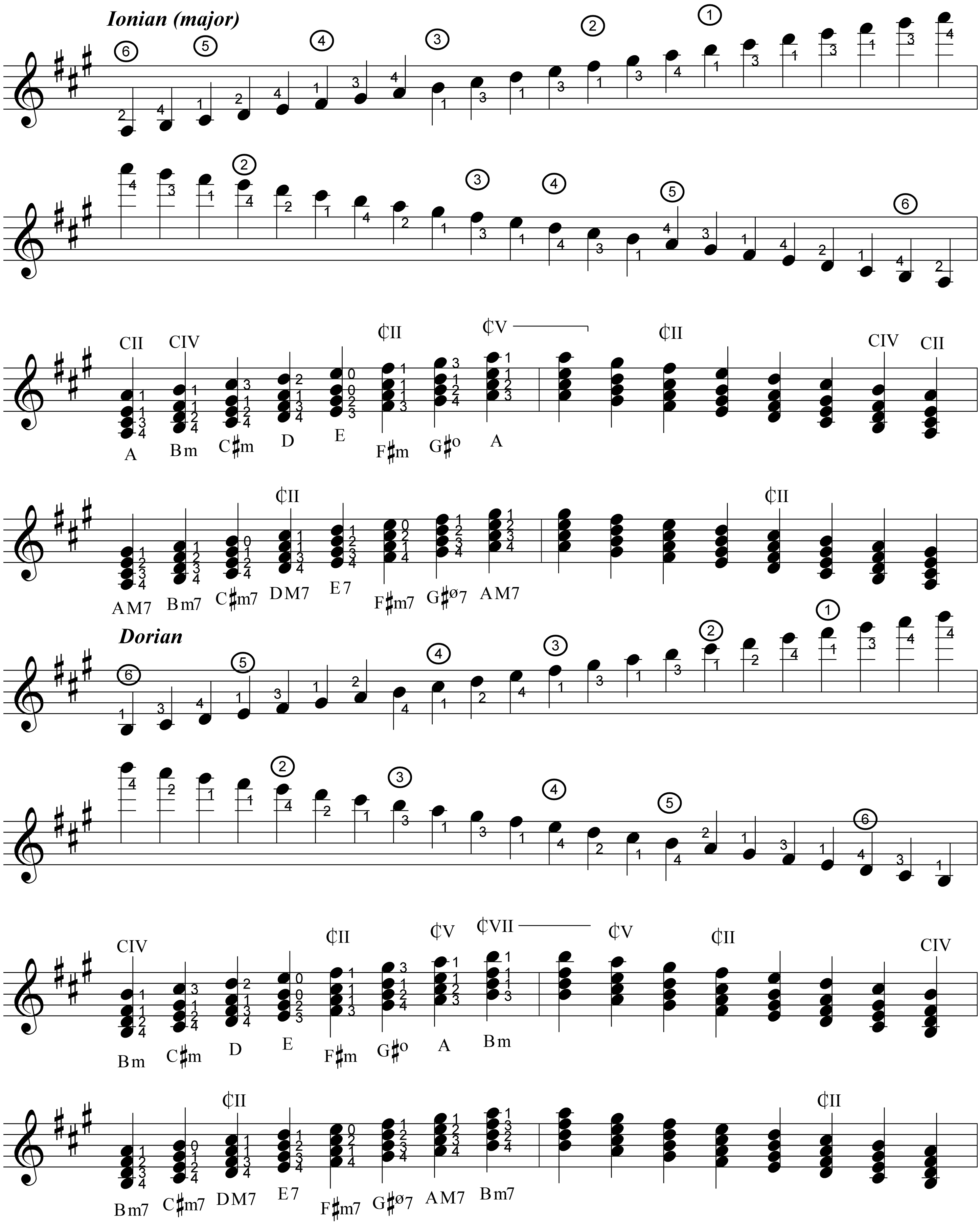
Melodic minor

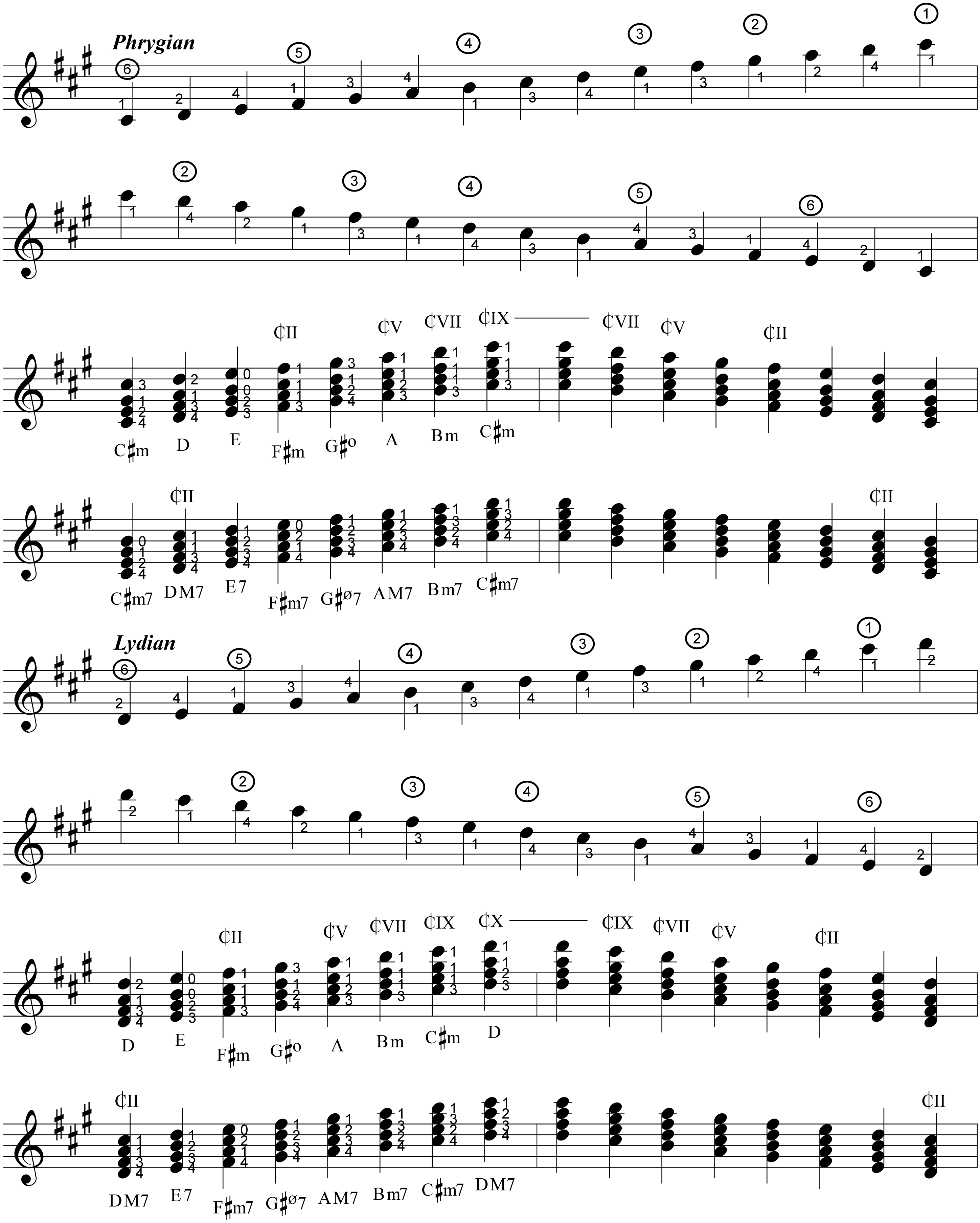


Locrian

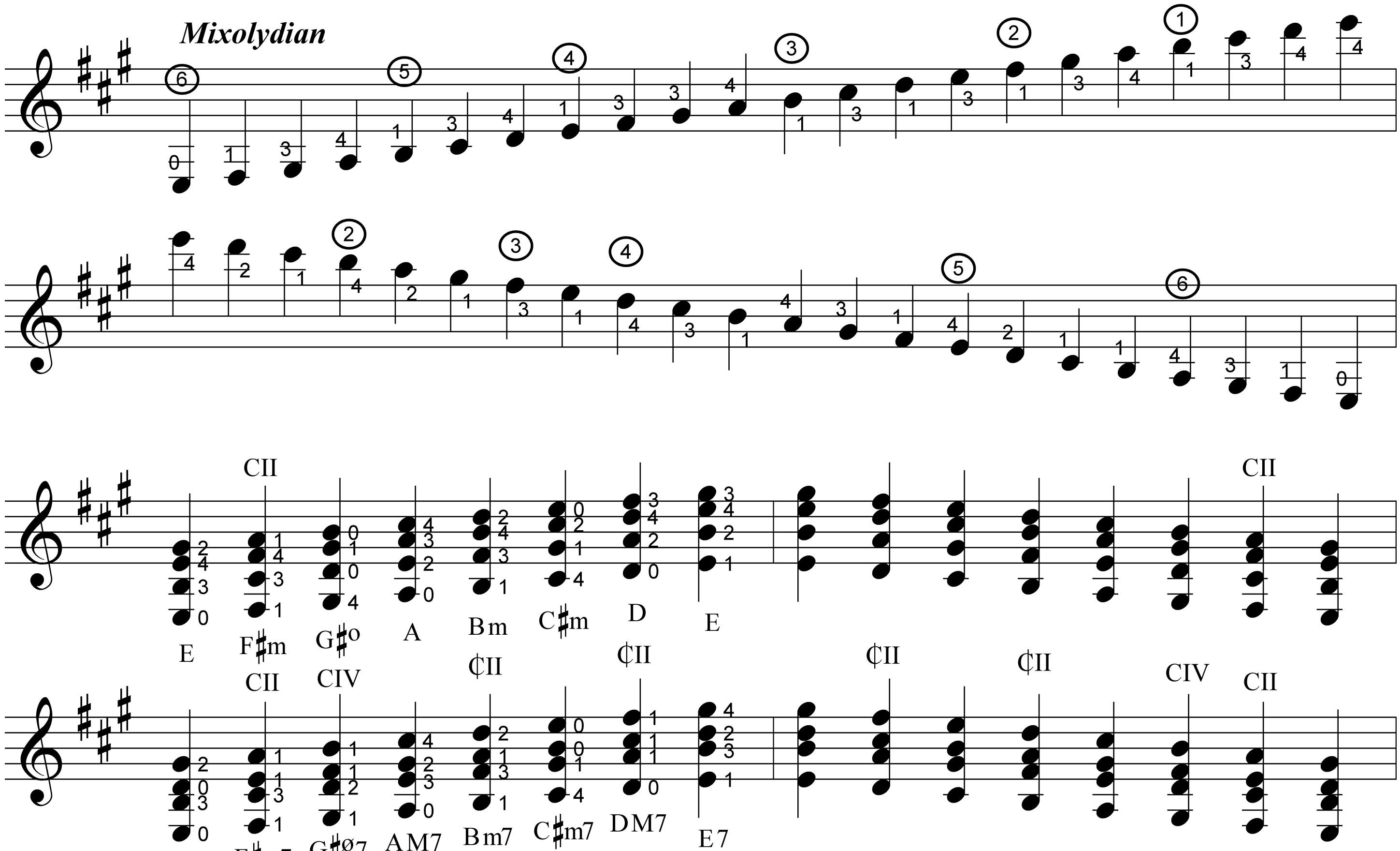

C♯o D Em F♯m G A Bm C♯o
₵II ₵III ₵V ₵VII ₵VII ₵V ₵III ₵II
C♯ø7 DM7 Em7 F♯m7 GM7 A7 Bm7 C♯ø7
₵II ₵II

Modal and Minor Scales (three sharps)

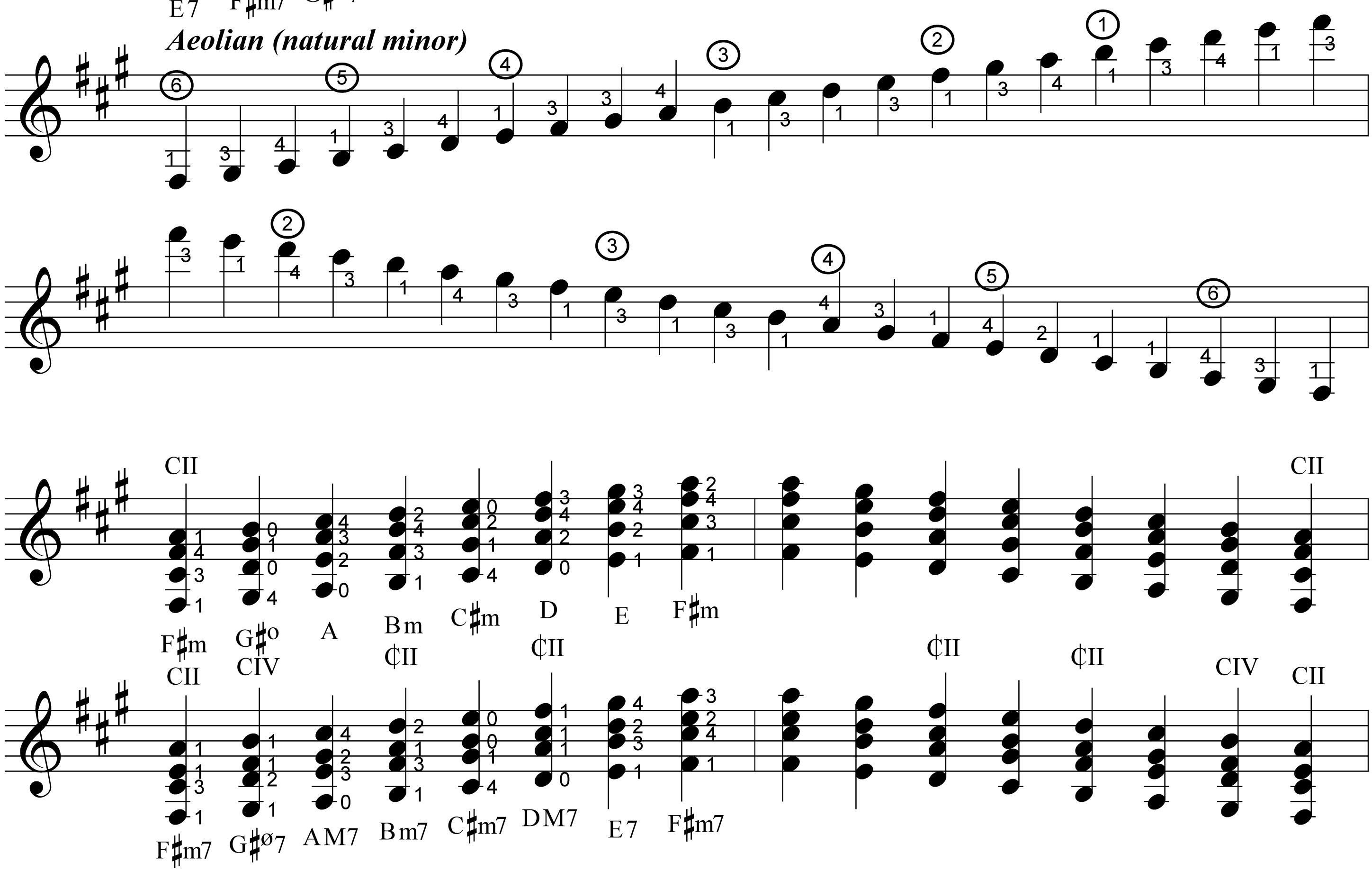



Phrygian
C♯m D E F♯m G♯o A Bm C♯m
¢II ¢V ¢VII ¢IX ¢VII ¢V ¢II
C♯m7 DM7 E7 F♯m7 G♯ø7 AM7 Bm7 C♯m7
¢II ¢II
Lydian
D E F♯m G♯o A Bm C♯m D
¢II ¢V ¢VII ¢IX ¢X ¢IX ¢VII ¢V ¢II
DM7 E7 F♯m7 G♯ø7 AM7 Bm7 C♯m7 DM7
¢II ¢II

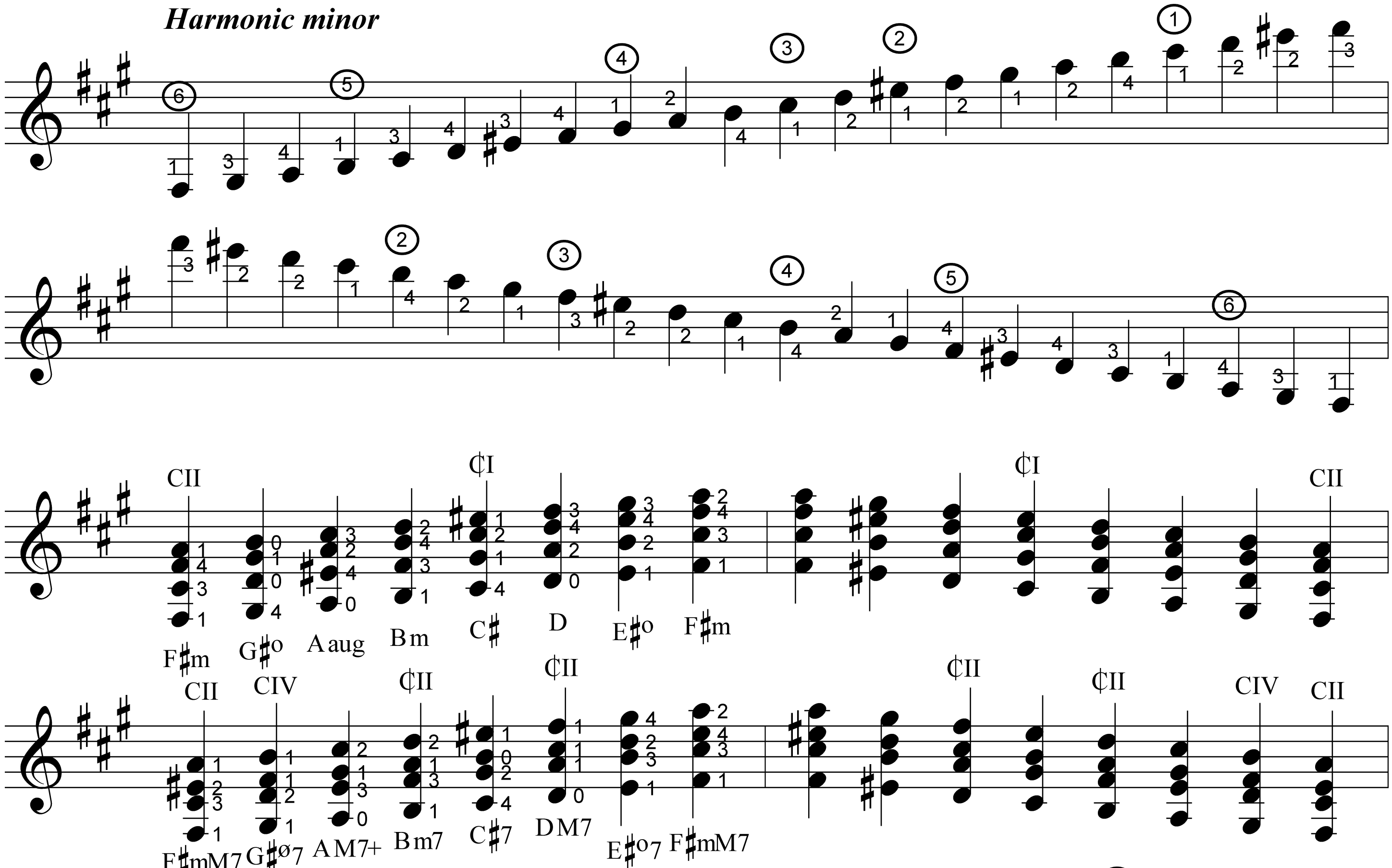
Mixolydian



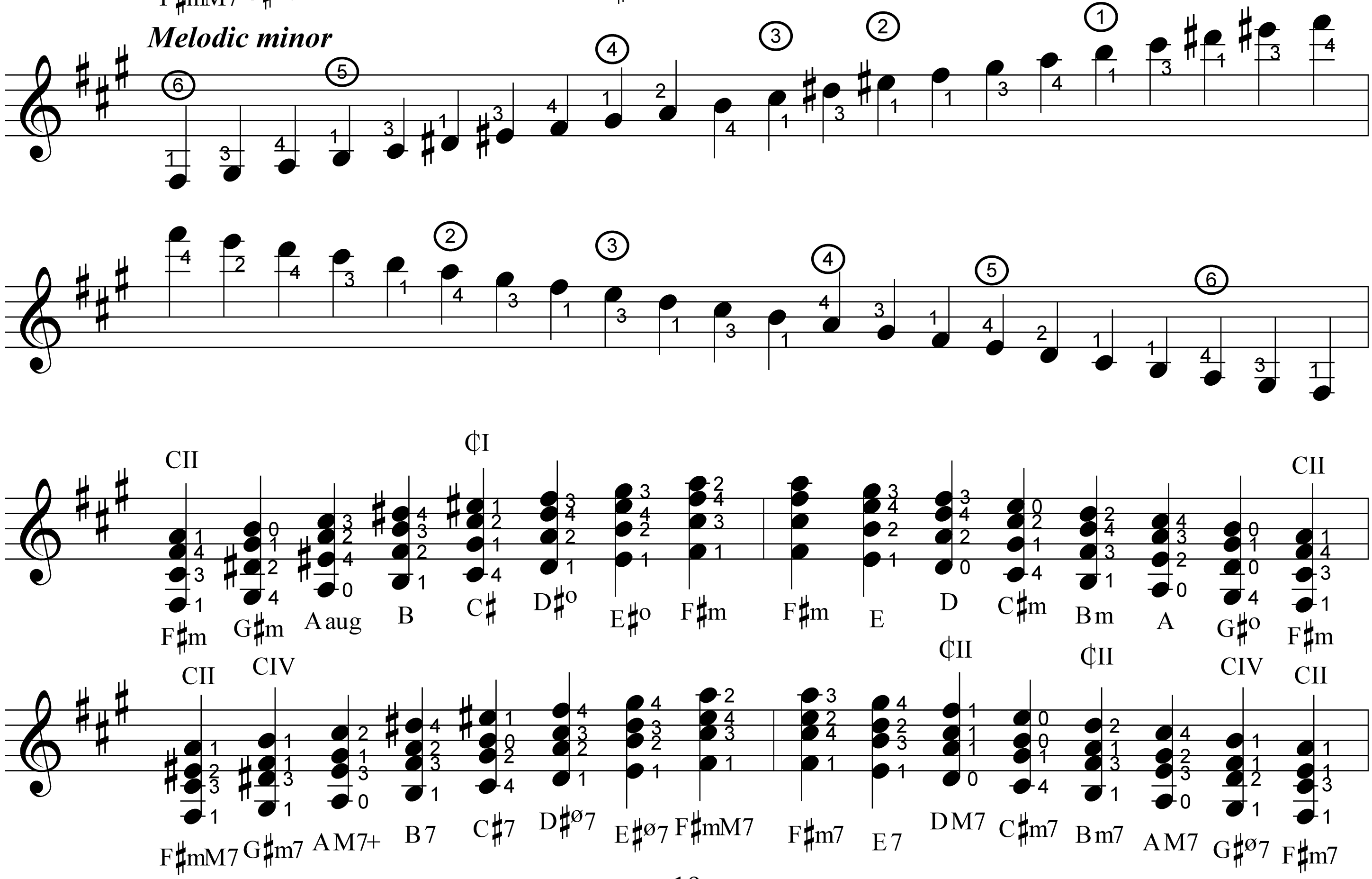
Aeolian (natural minor)



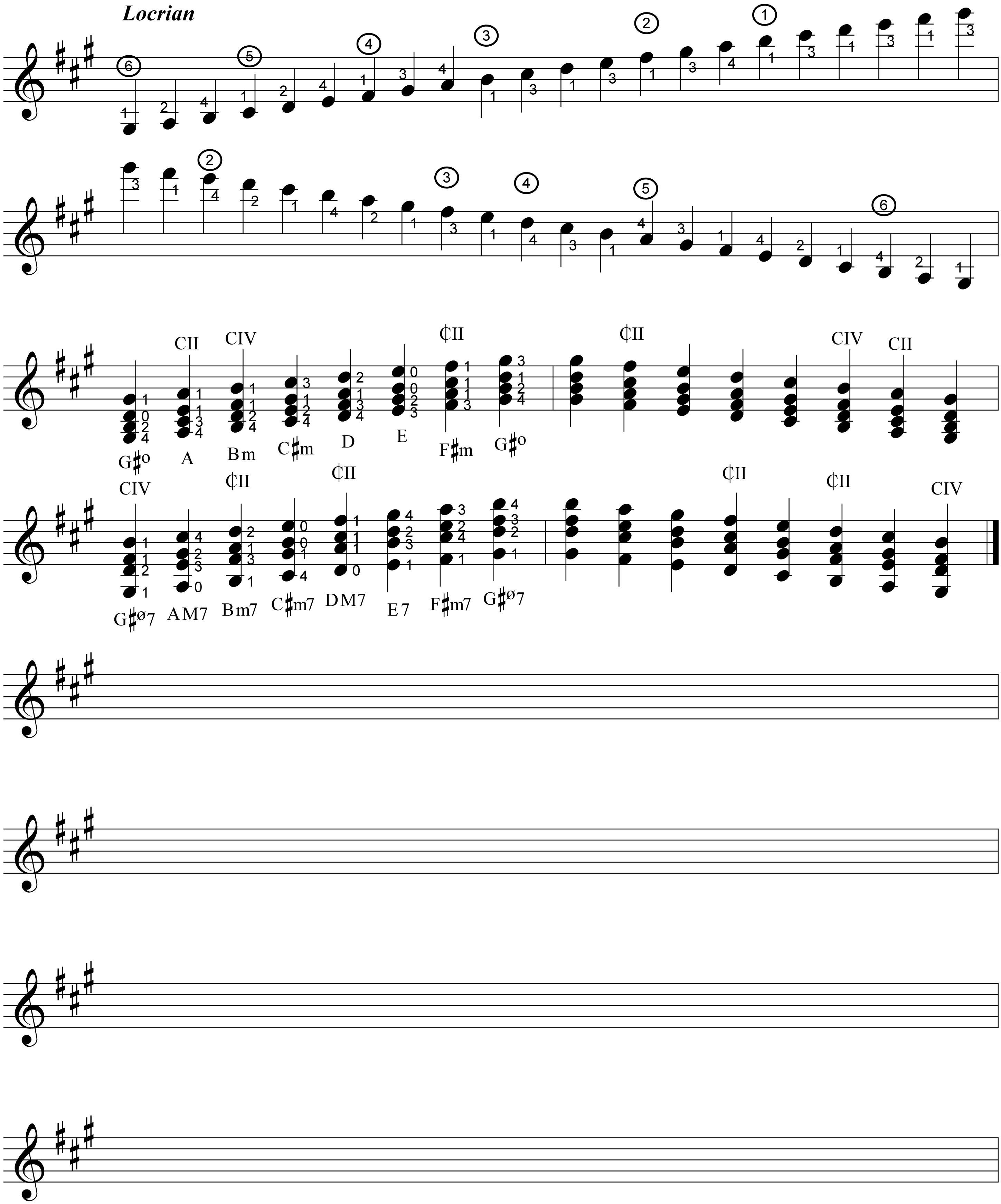
Harmonic minor



Melodic minor

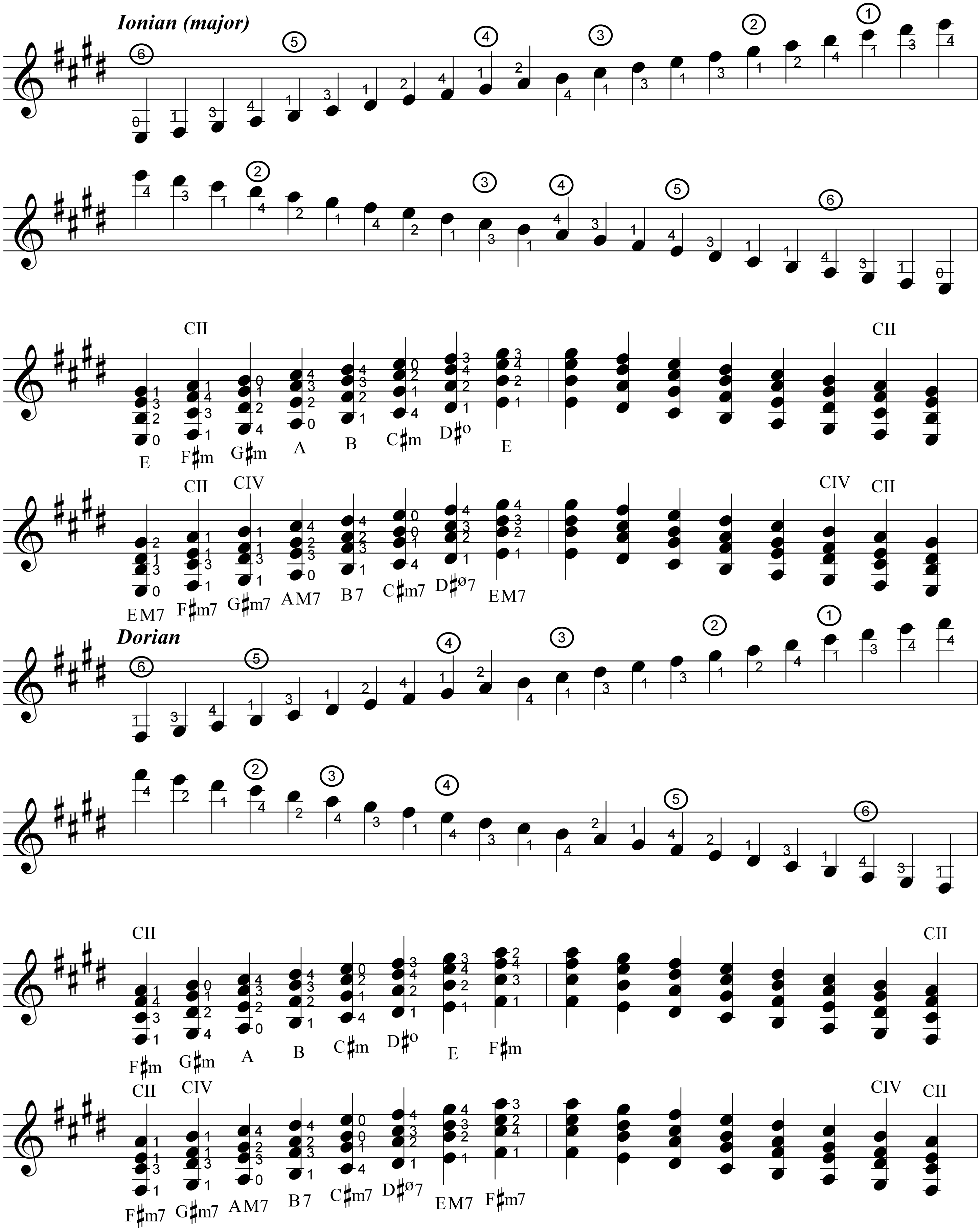


Locrian

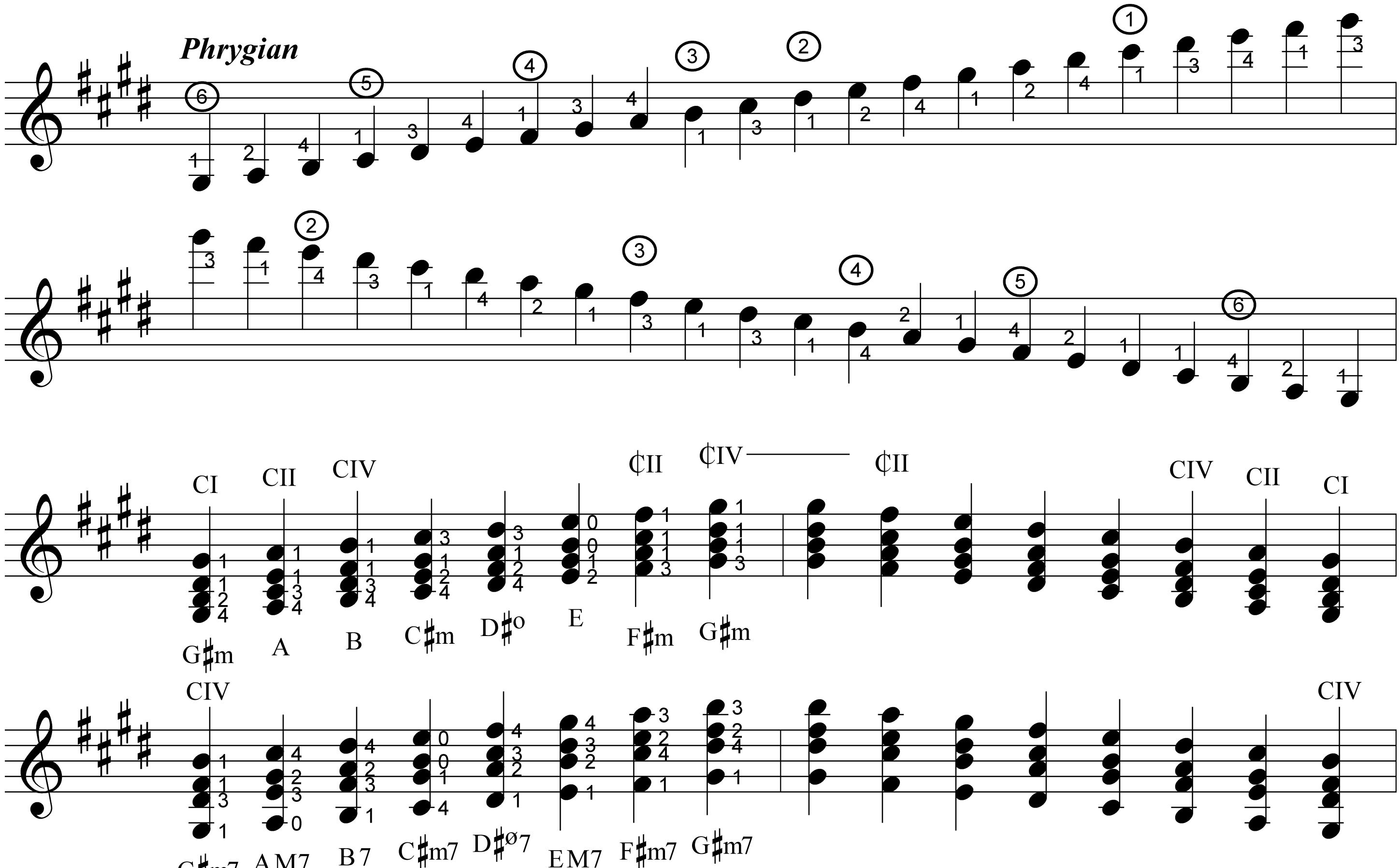


CII
CIV
₵II
₵II
CIV
CII
G♯o
A
Bm
C♯m
D
E
F♯m
G♯o
CIV
₵II
₵II
₵II
₵II
CIV
G♯ø7
AM7
Bm7
C♯m7
DM7
E7
F♯m7
G♯ø7

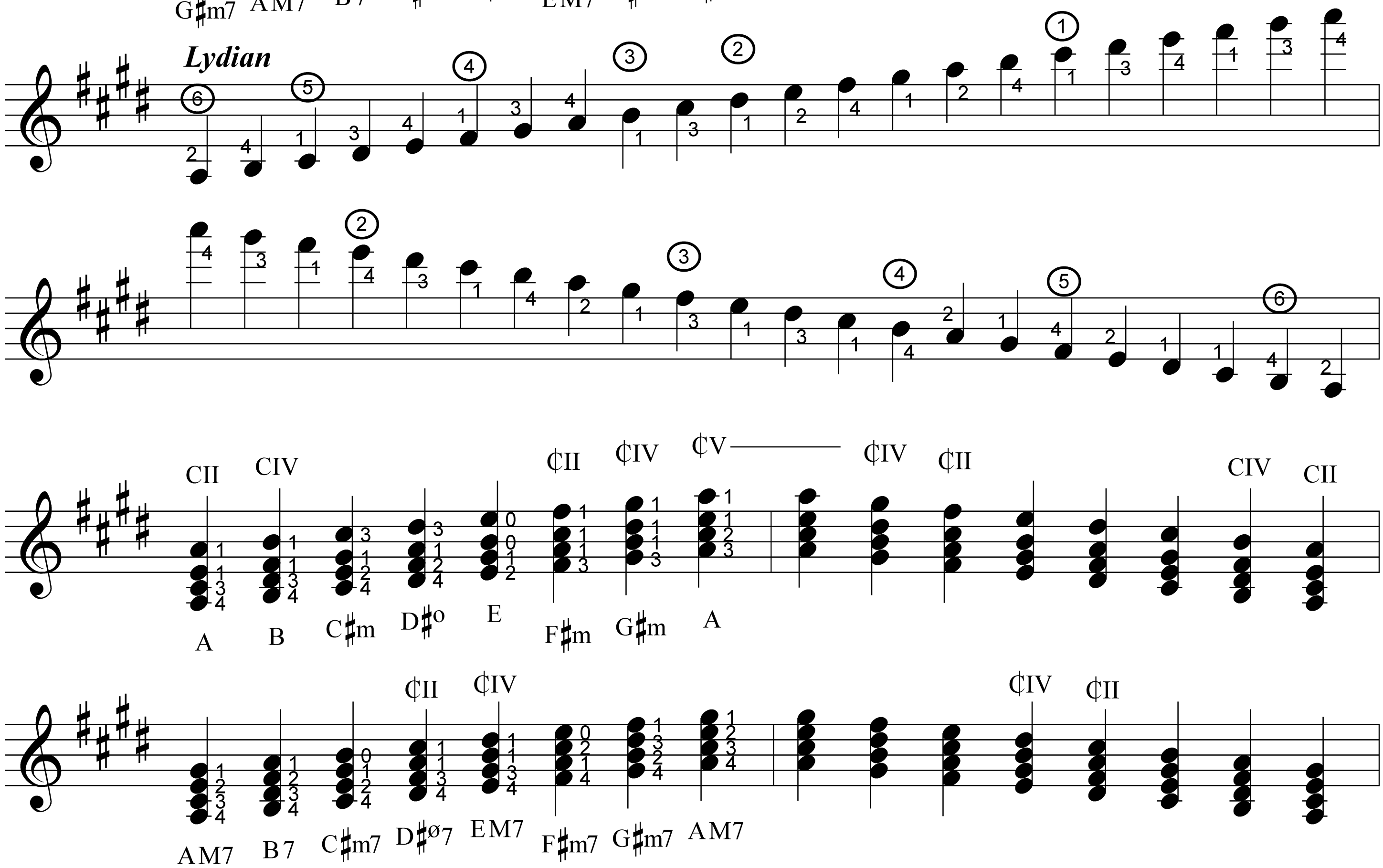
Modal and Minor Scales (four sharps)



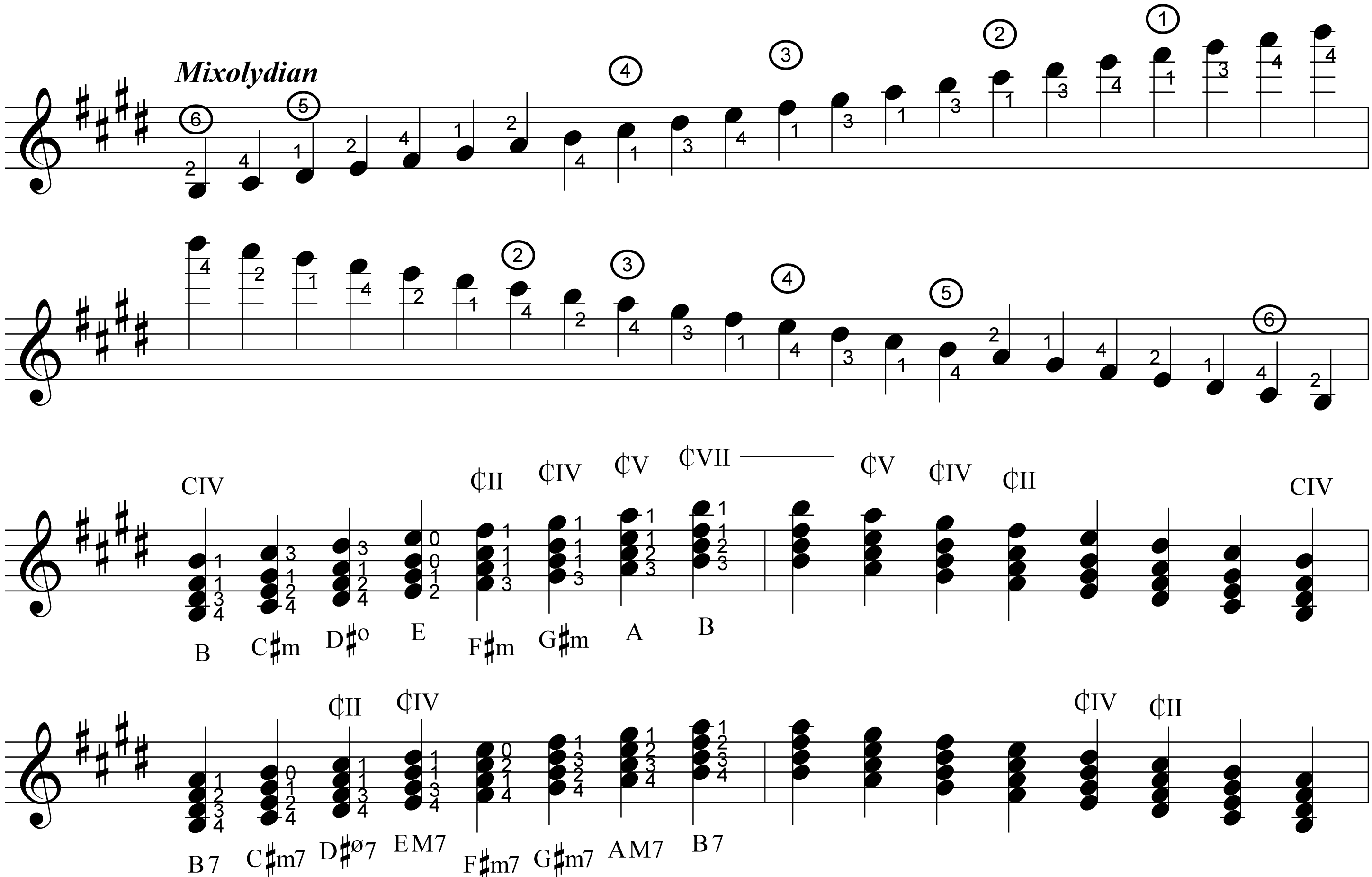
Phrygian



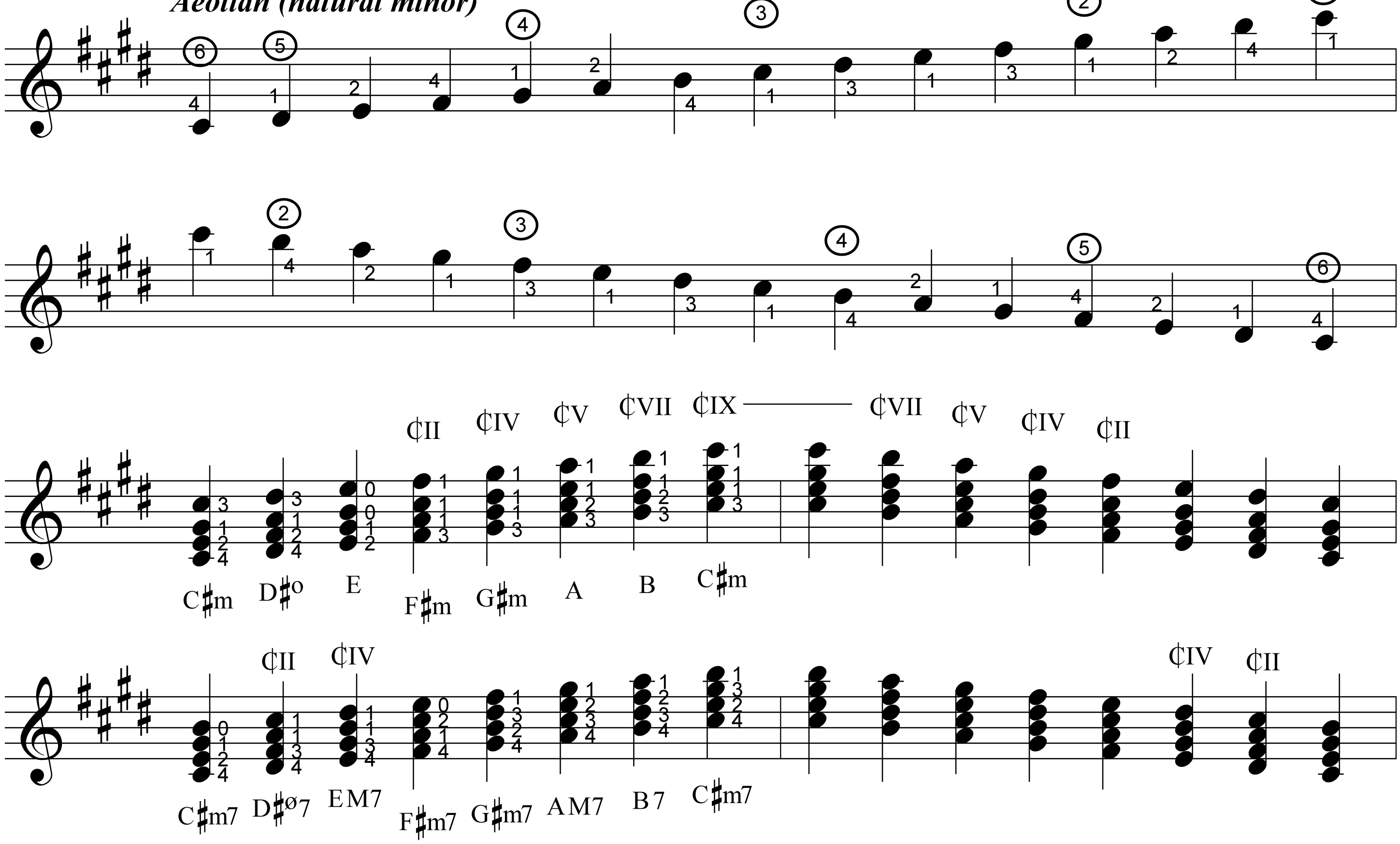
Lydian



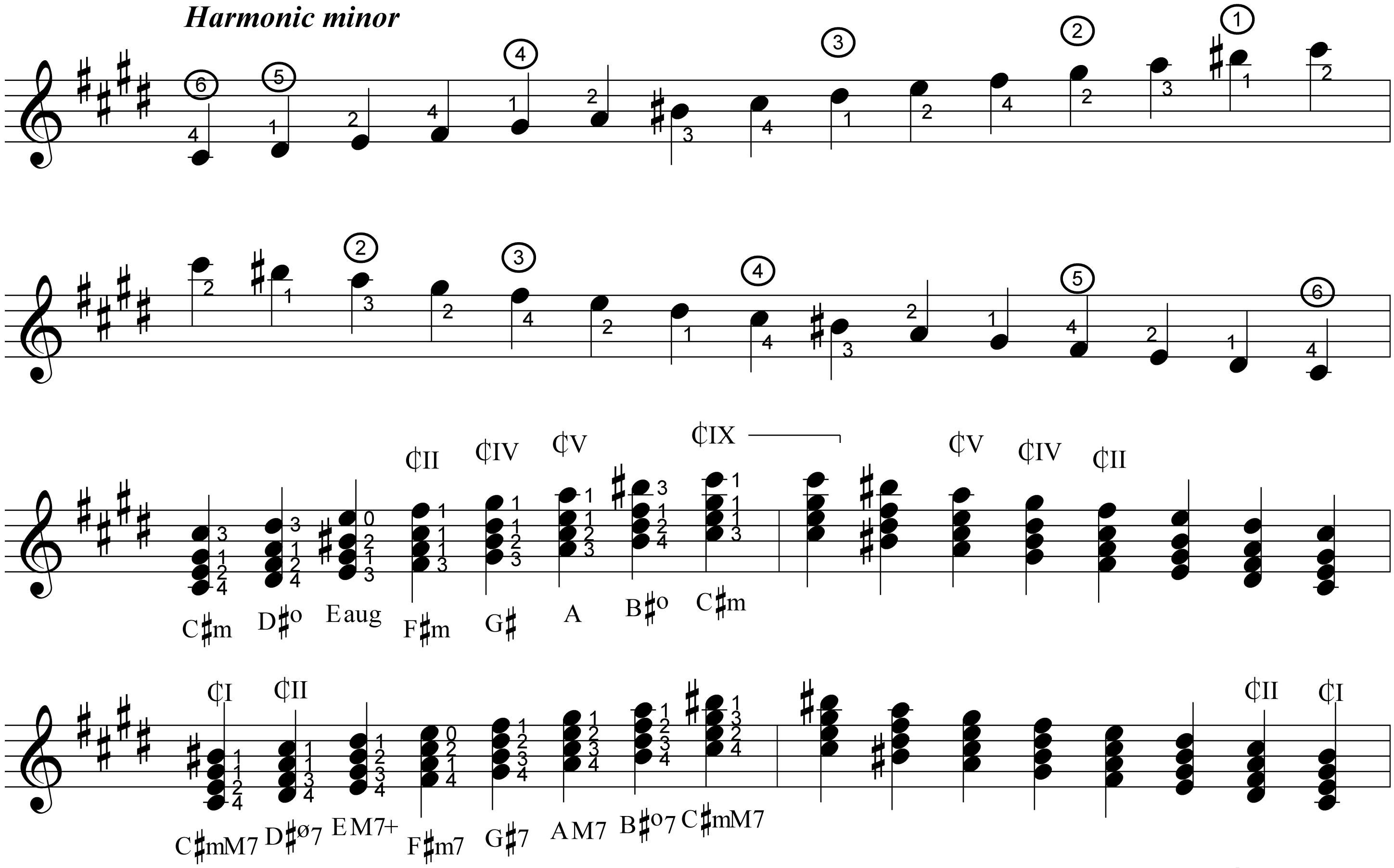
Mixolydian



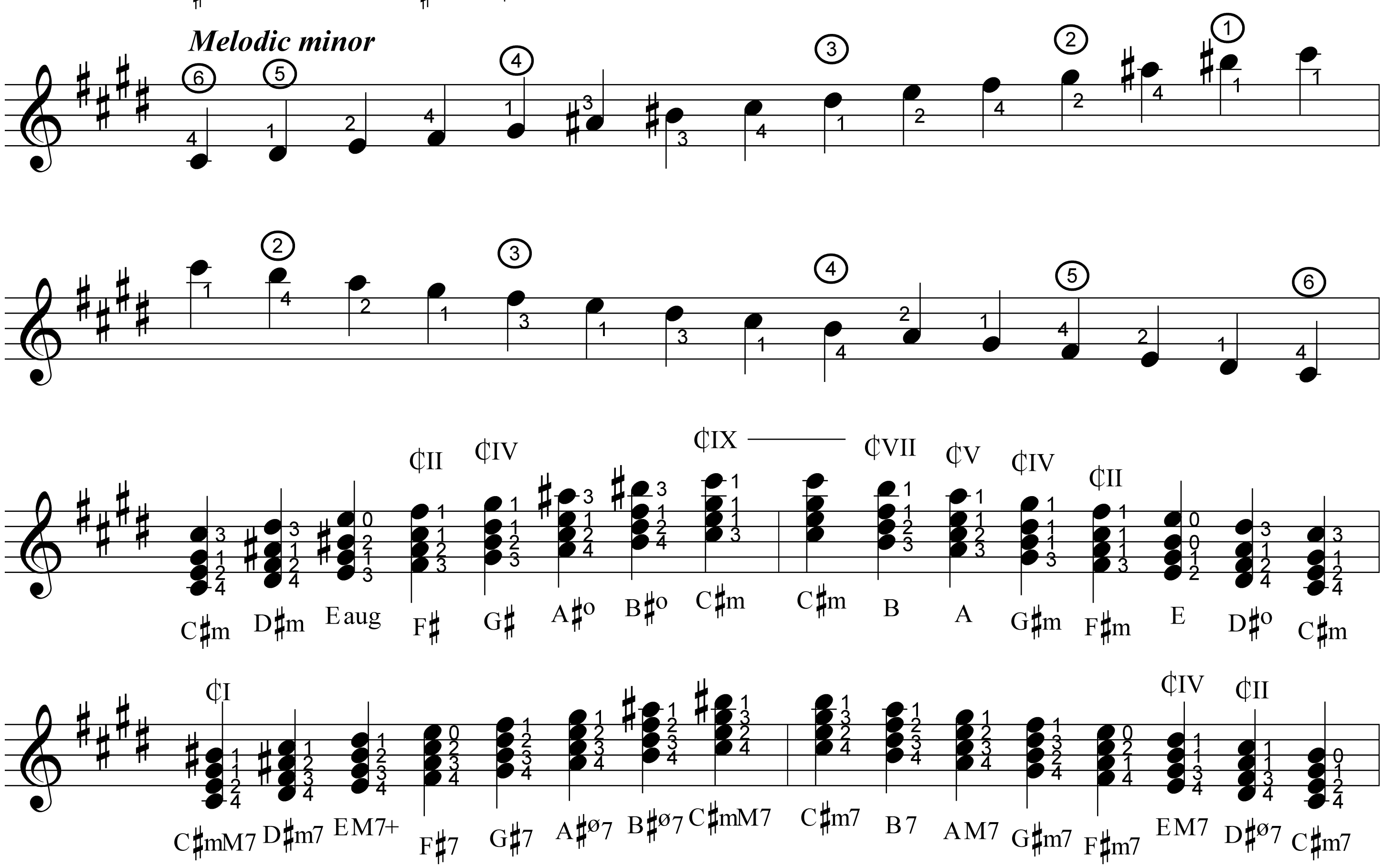
Aeolian (natural minor)

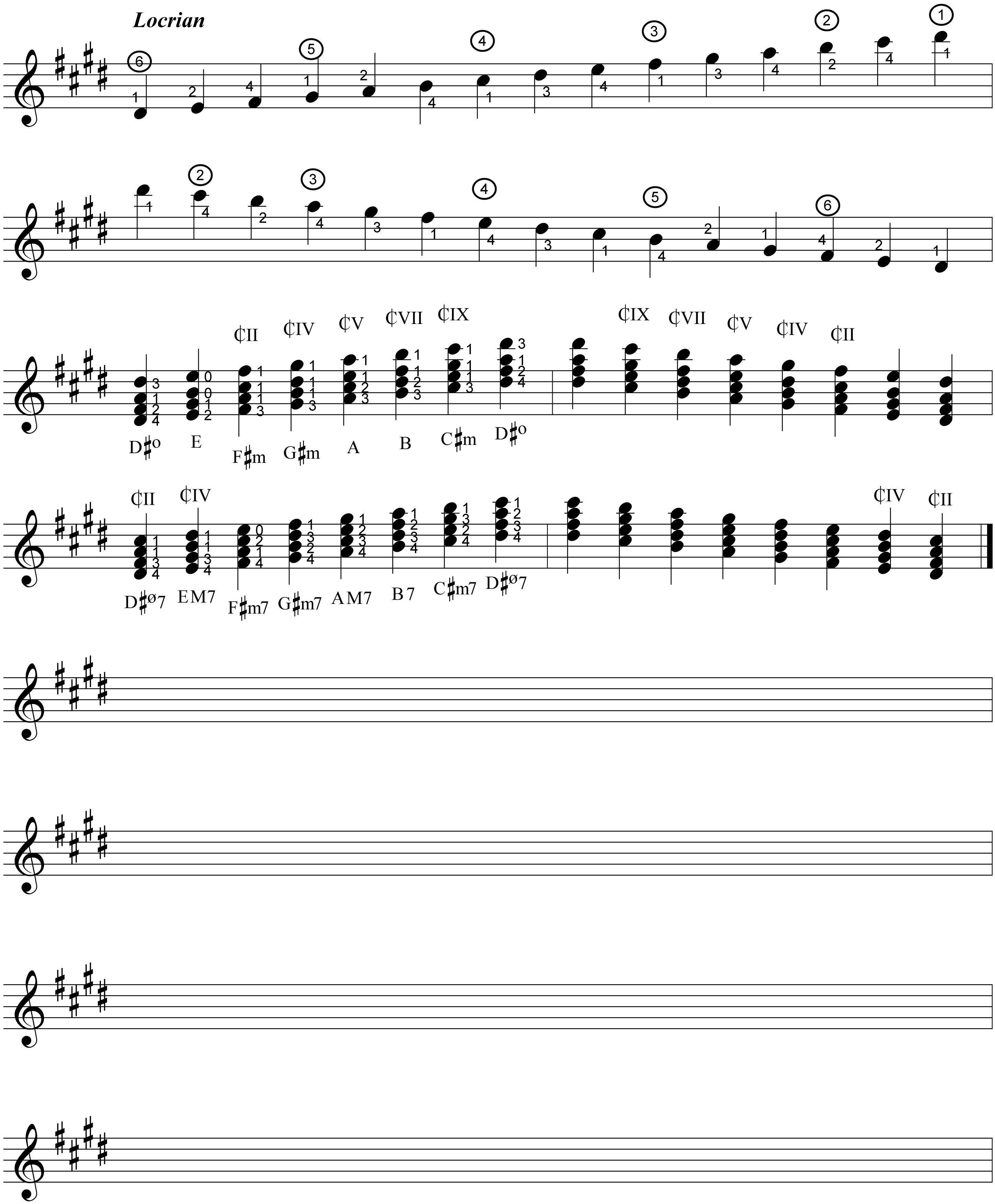


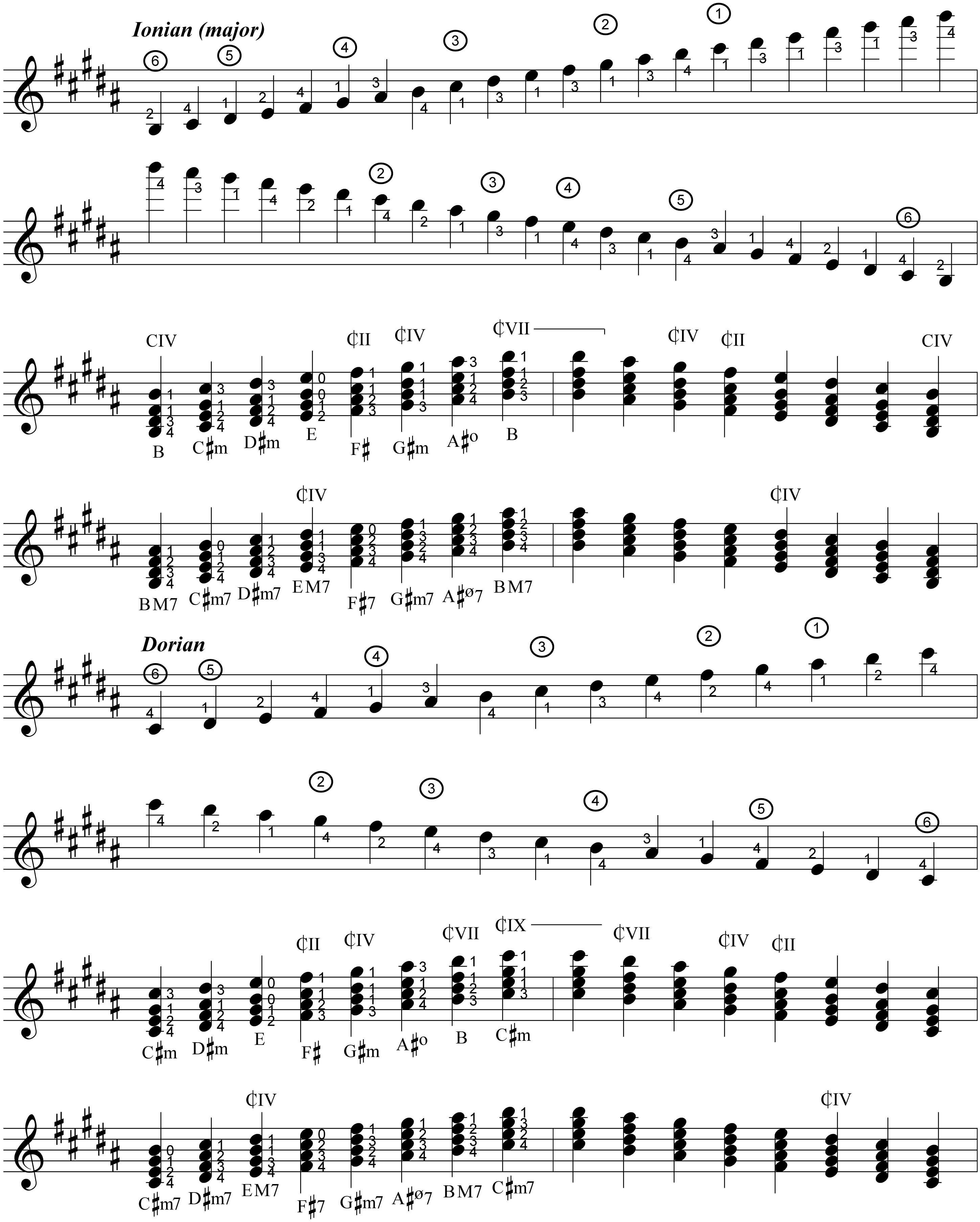
Harmonic minor

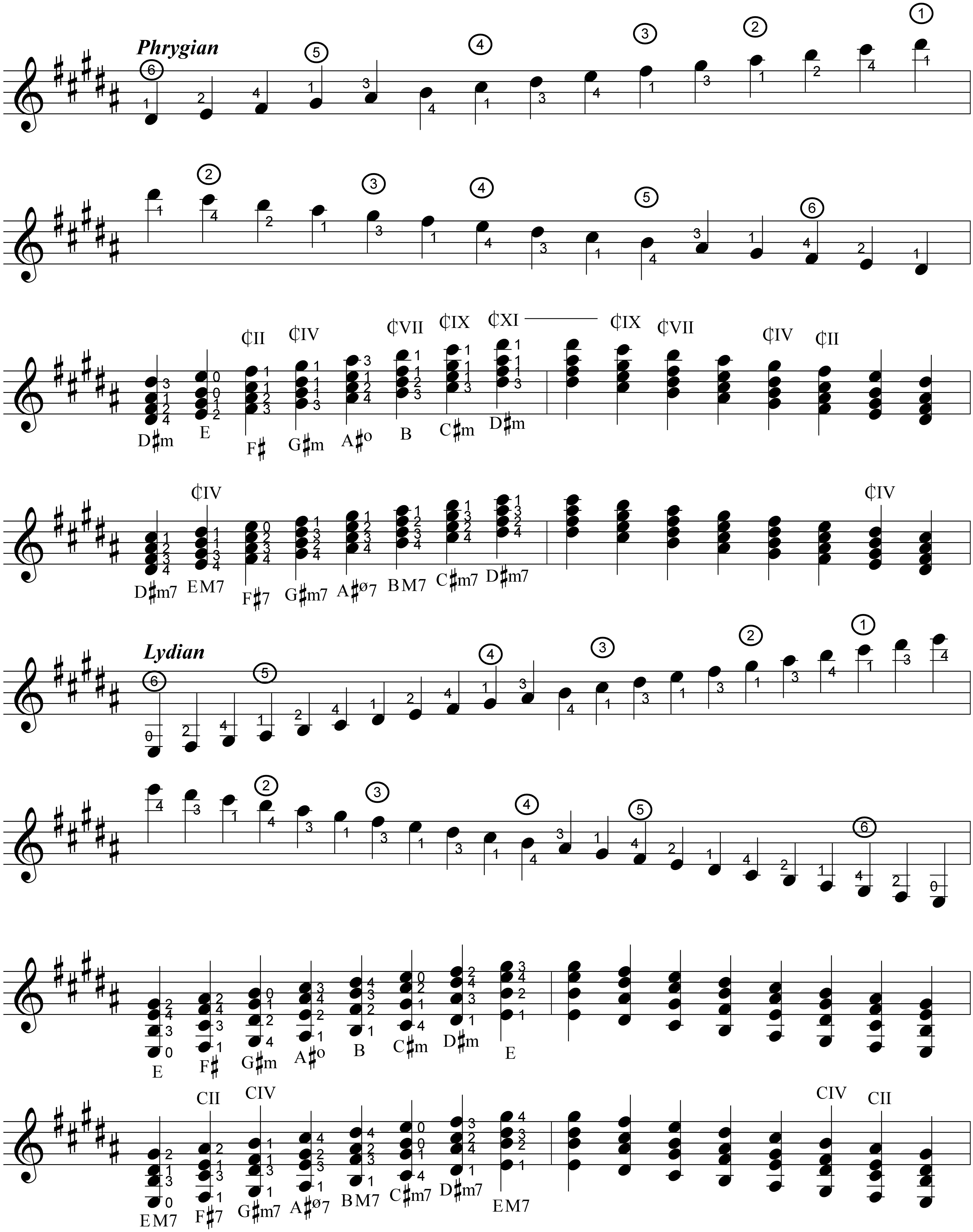


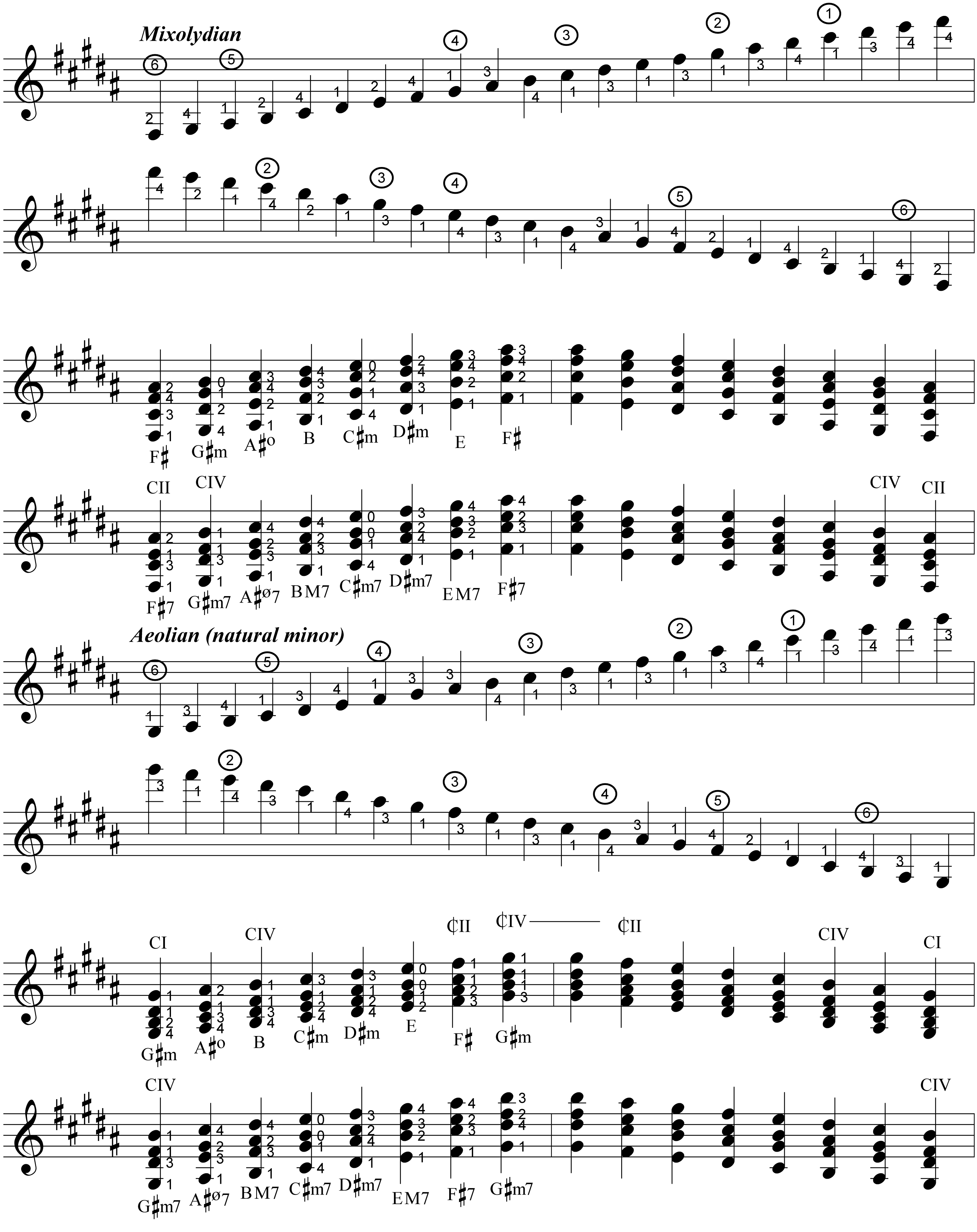
Melodic minor

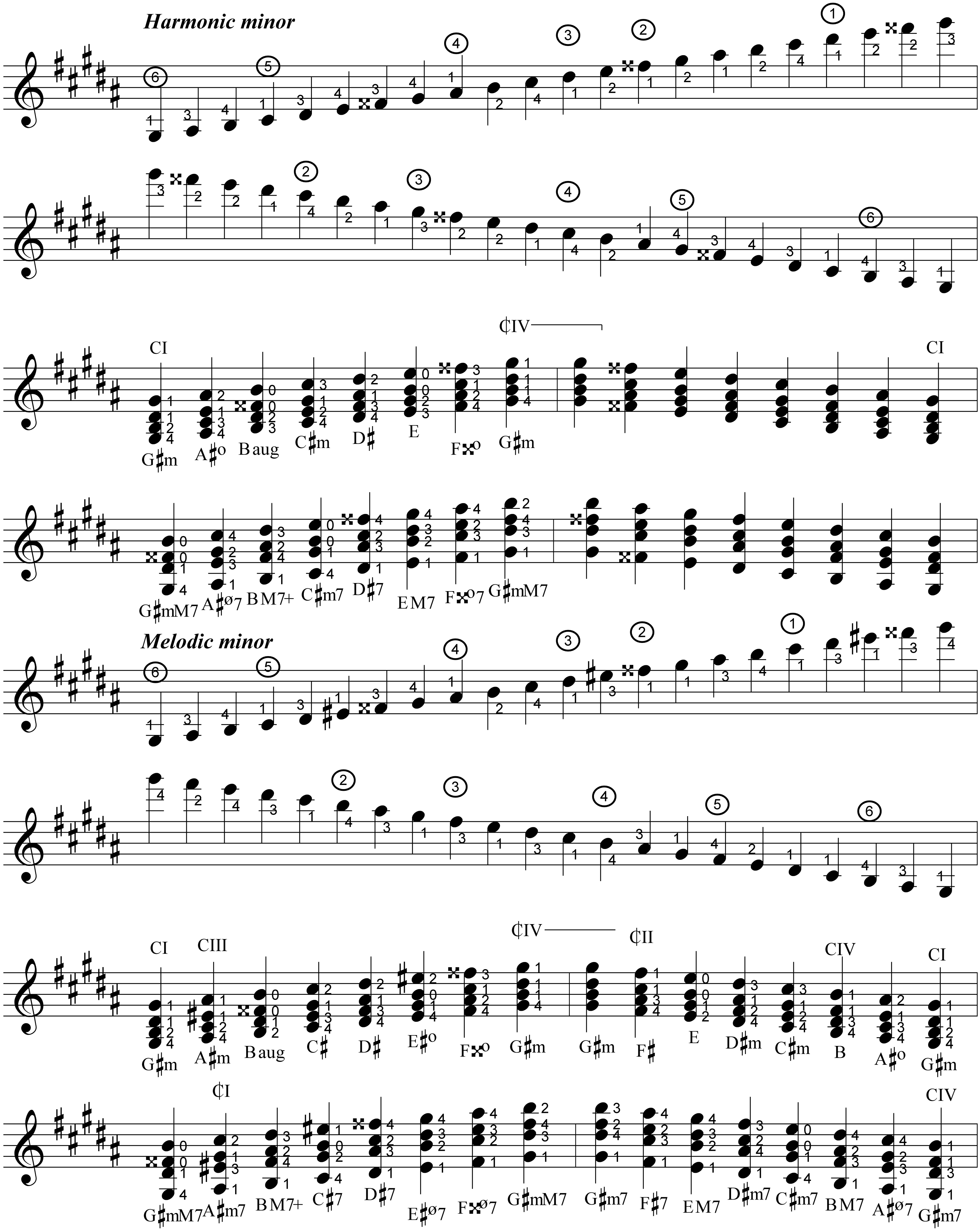



Locrian
¢II ¢IV ¢V ¢VII ¢IX ¢IX ¢VII ¢V ¢IV ¢II
D♯o E F♯m G♯m A B C♯m D♯o
¢II ¢IV ¢IV ¢II
D♯ø7 EM7 F♯m7 G♯m7 AM7 B7 C♯m7 D♯ø7

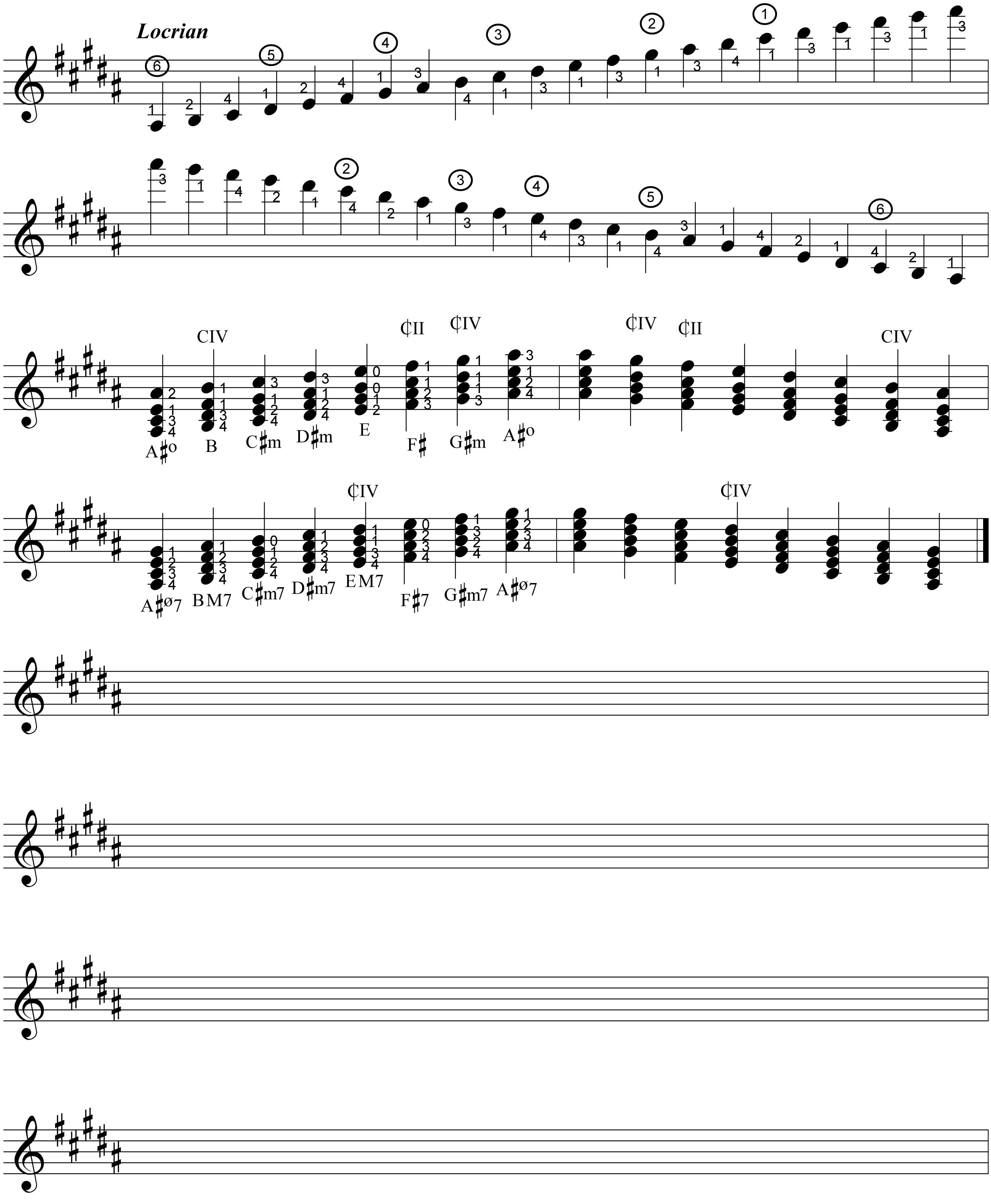

Ionian (major)
CIV
₵II
₵IV
₵VII
₵IV
₵II
CIV
B
C♯m
D♯m
E
F♯
G♯m
A♯o
B
₵IV
₵IV
BM7
C♯m7
D♯m7
EM7
F♯7
G♯m7
A♯ø7
BM7
Dorian
₵II
₵IV
₵VII
₵IX
₵VII
₵IV
₵II
C♯m
D♯m
E
F♯
G♯m
A♯o
B
C♯m
₵IV
₵IV
C♯m7
D♯m7
EM7
F♯7
G♯m7
A♯ø7
BM7
C♯m7


Phrygian
¢II ¢IV ¢VII ¢IX ¢XI ¢IX ¢VII ¢IV ¢II
D♯m E F♯ G♯m A♯o B C♯m D♯m
¢IV ¢IV
D♯m7 EM7 F♯7 G♯m7 A♯ø7 BM7 C♯m7 D♯m7
Lydian
E F♯ G♯m A♯o B C♯m D♯m E
CII CIV CIV CII
EM7 F♯7 G♯m7 A♯ø7 BM7 C♯m7 D♯m7 EM7

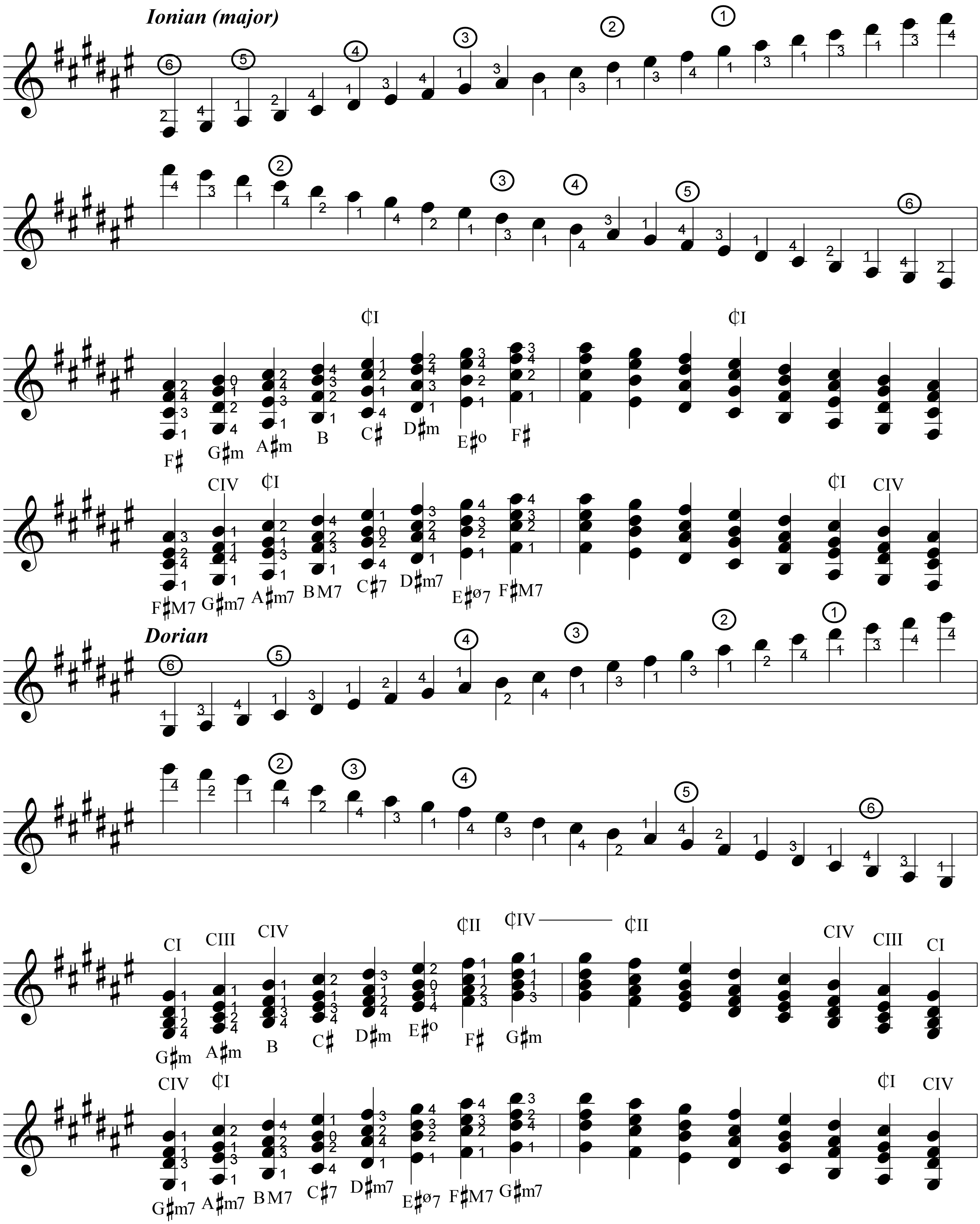

Mixolydian
F♯ G♯m A♯o B C♯m D♯m E F♯
CII CIV CIV CII
F♯7 G♯m7 A♯ø7 BM7 C♯m7 D♯m7 EM7 F♯7
Aeolian (natural minor)
CI CIV ¢II ¢IV ¢II CIV CI
G♯m A♯o B C♯m D♯m E F♯ G♯m
CIV CIV
G♯m7 A♯ø7 BM7 C♯m7 D♯m7 EM7 F♯7 G♯m7

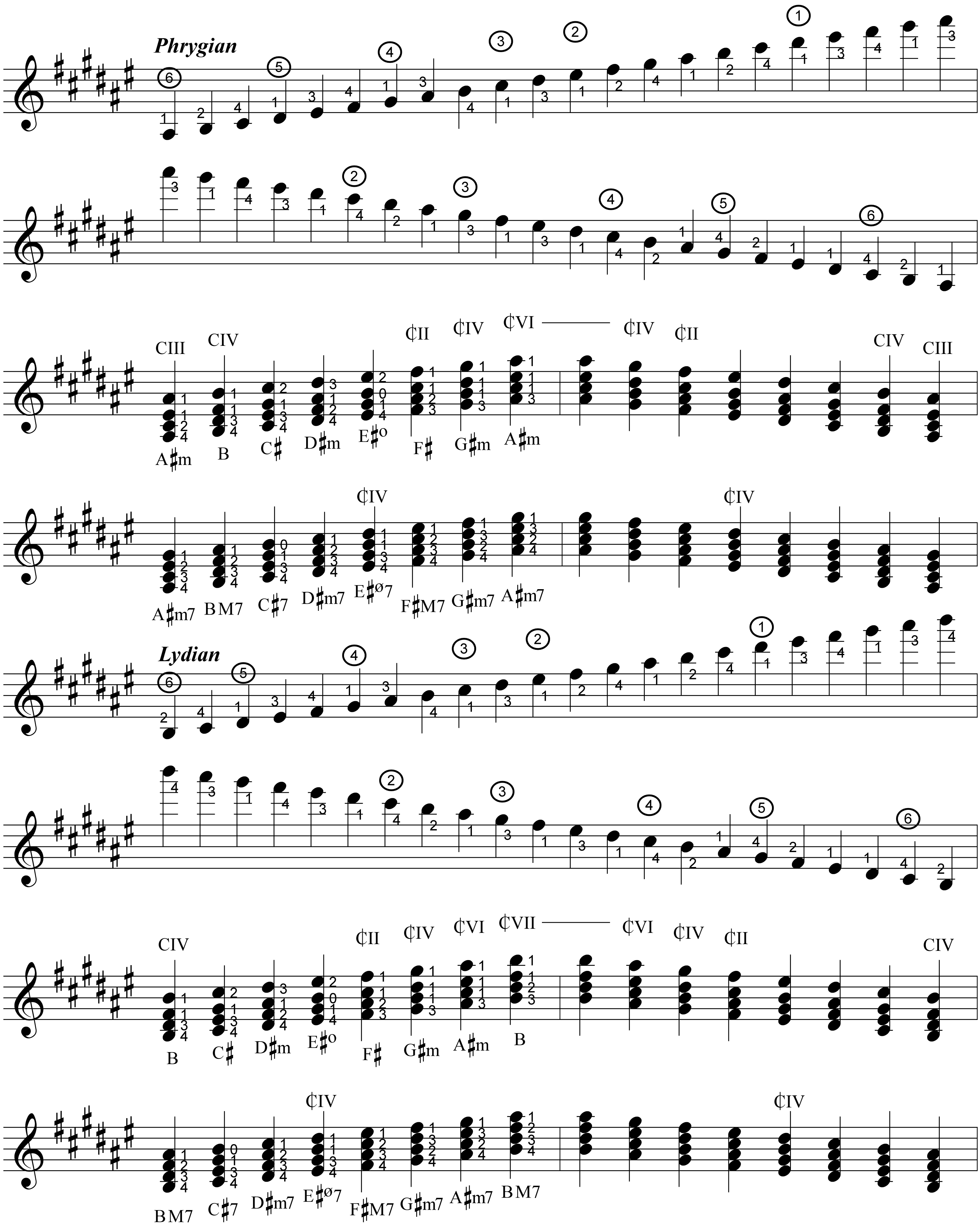


Harmonic minor
CI
¢IV
CI
G♯m
A♯o
Baug
C♯m
D♯
E
F𝄪o
G♯m
G♯mM7
A♯ø7
BM7+
C♯m7
D♯7
EM7
F𝄪o7
G♯mM7
Melodic minor
CI
CIII
¢IV
¢II
CIV
CI
G♯m
A♯m
Baug
C♯
D♯
E♯o
F𝄪o
G♯m
G♯m
F♯
E
D♯m
C♯m
B
A♯o
G♯m
¢I
CIV
G♯mM7
A♯m7
BM7+
C♯7
D♯7
E♯ø7
F𝄪ø7
G♯mM7
G♯m7
F♯7
EM7
D♯m7
C♯m7
BM7
A♯ø7
G♯m7

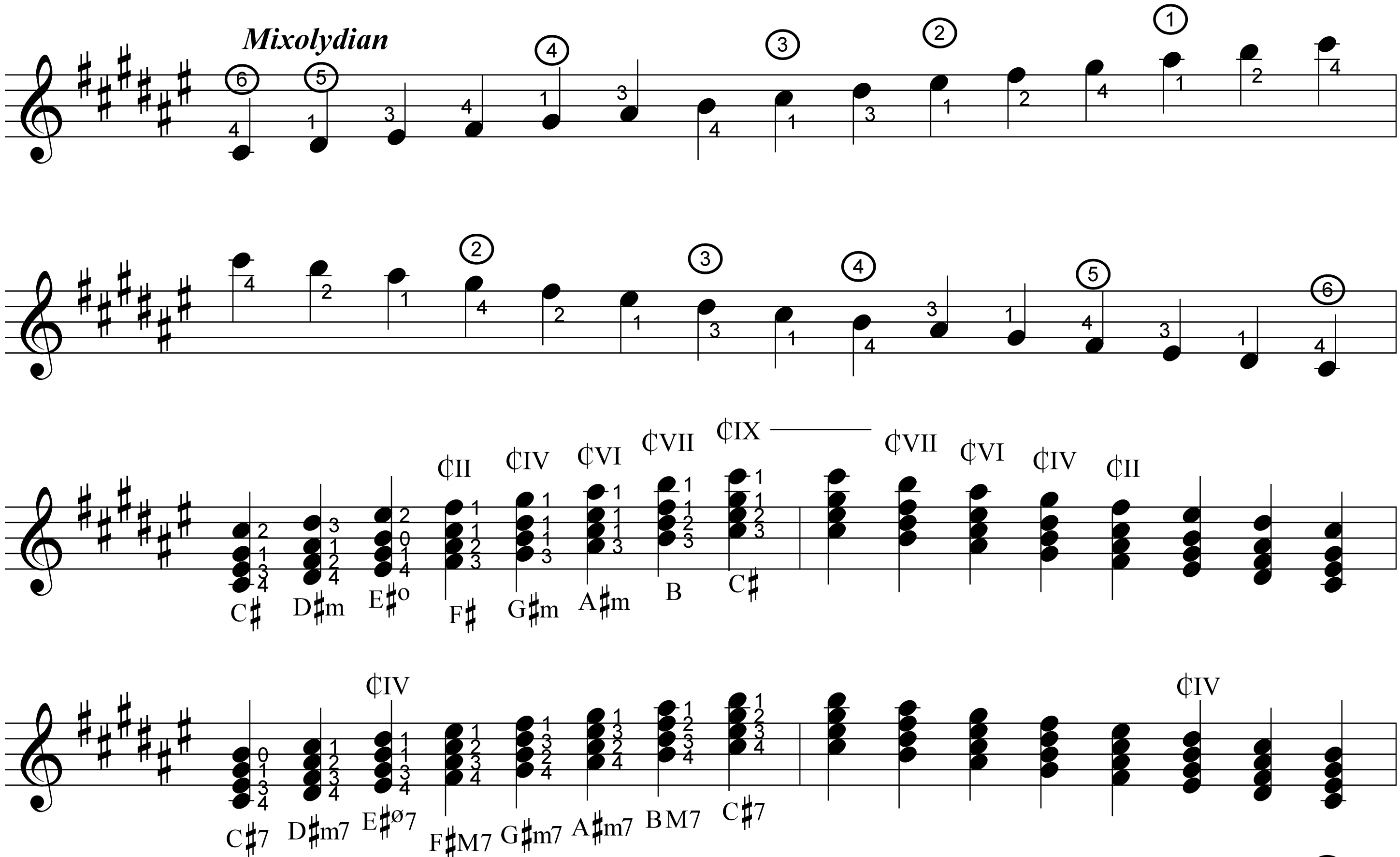

Locrian
CIV
¢II
¢IV
A♯o
B
C♯m
D♯m
E
F♯
G♯m
A♯o
¢IV
¢II
CIV
¢IV
A♯ø7
BM7
C♯m7
D♯m7
EM7
F♯7
G♯m7
A♯ø7
¢IV

Modal and Minor Scales (six sharps)

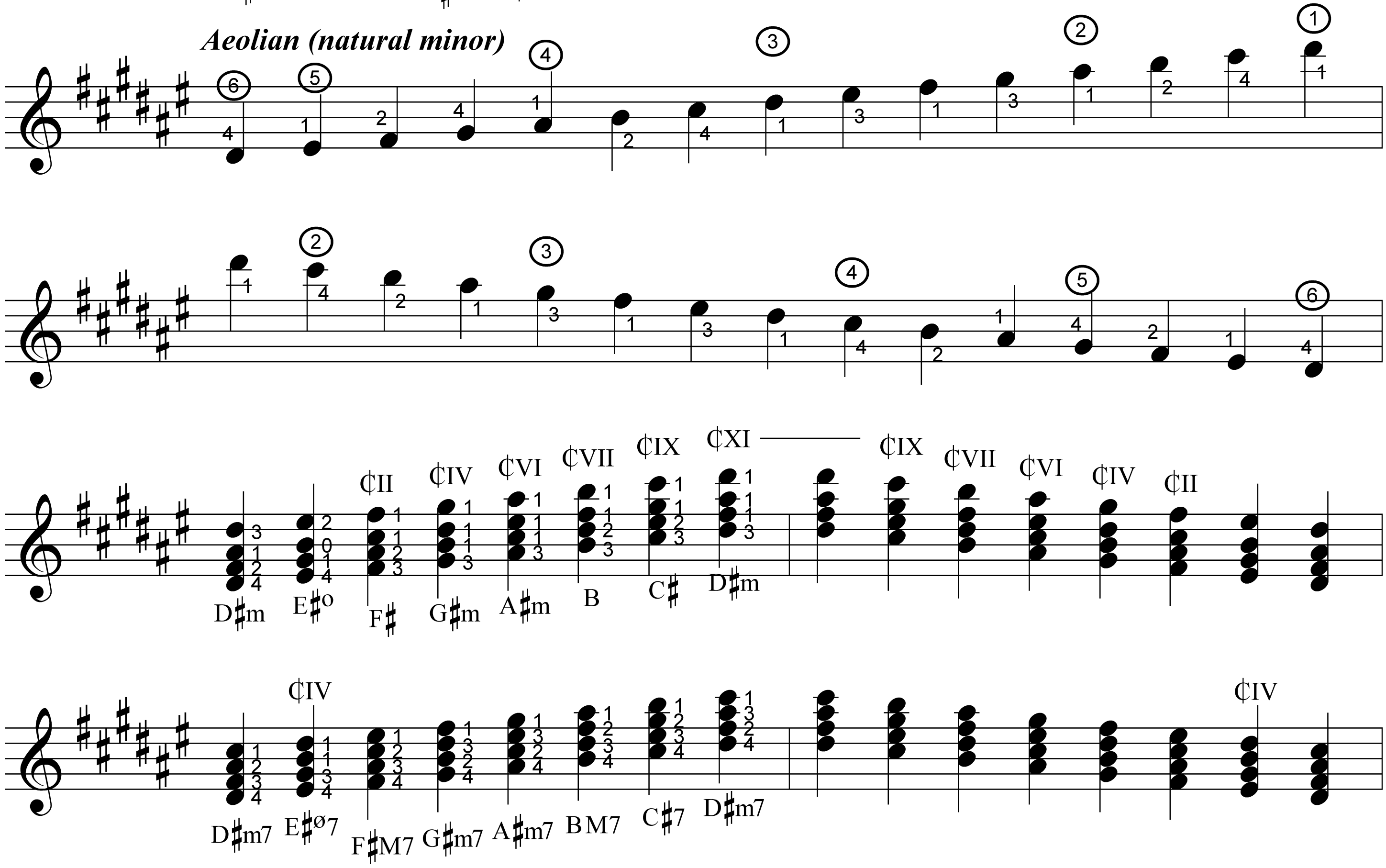


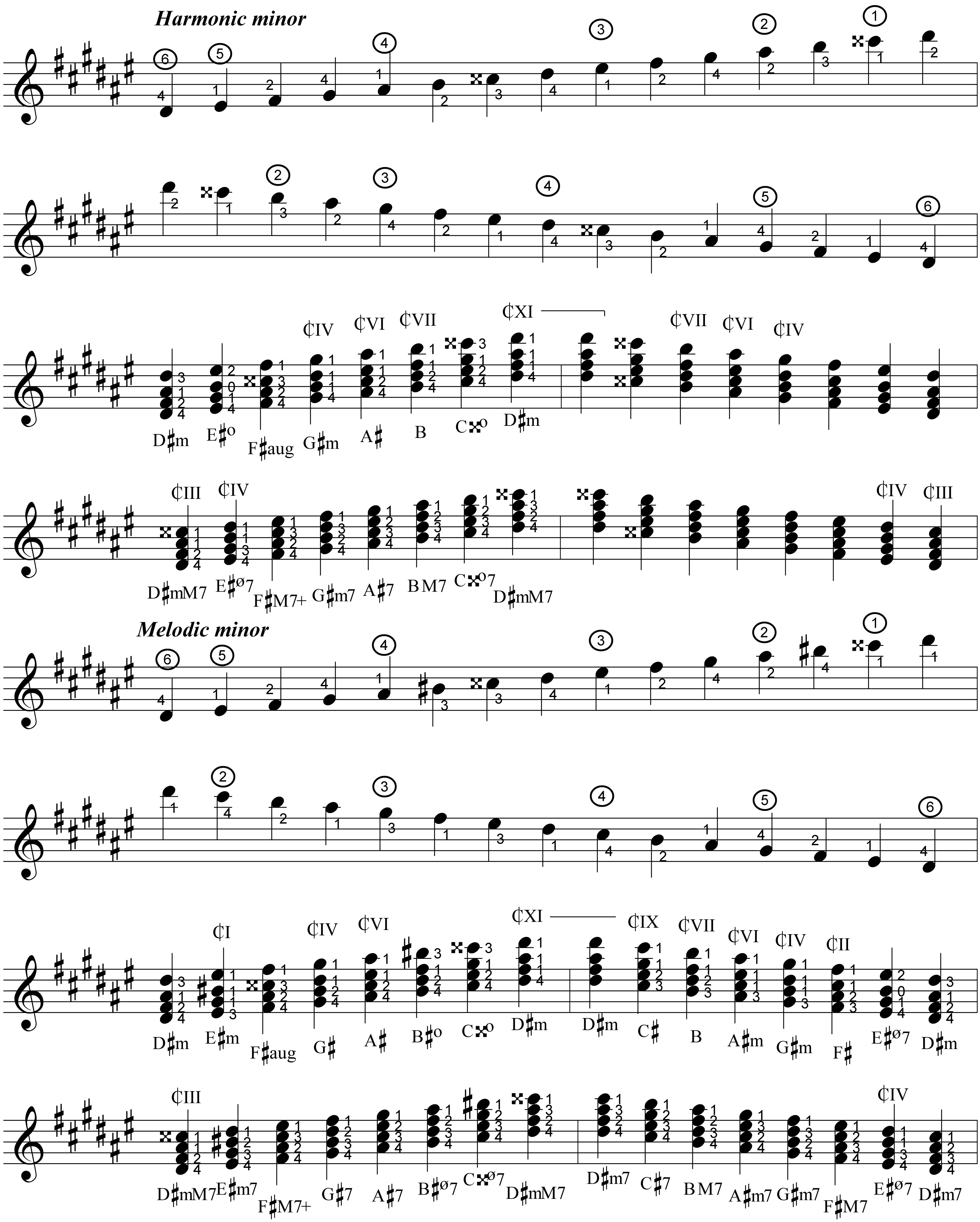

Phrygian
A♯m B C♯ D♯m E♯o F♯ G♯m A♯m
A♯m7 BM7 C♯7 D♯m7 E♯ø7 F♯M7 G♯m7 A♯m7
Lydian
B C♯ D♯m E♯o F♯ G♯m A♯m B
BM7 C♯7 D♯m7 E♯ø7 F♯M7 G♯m7 A♯m7 BM7

Mixolydian

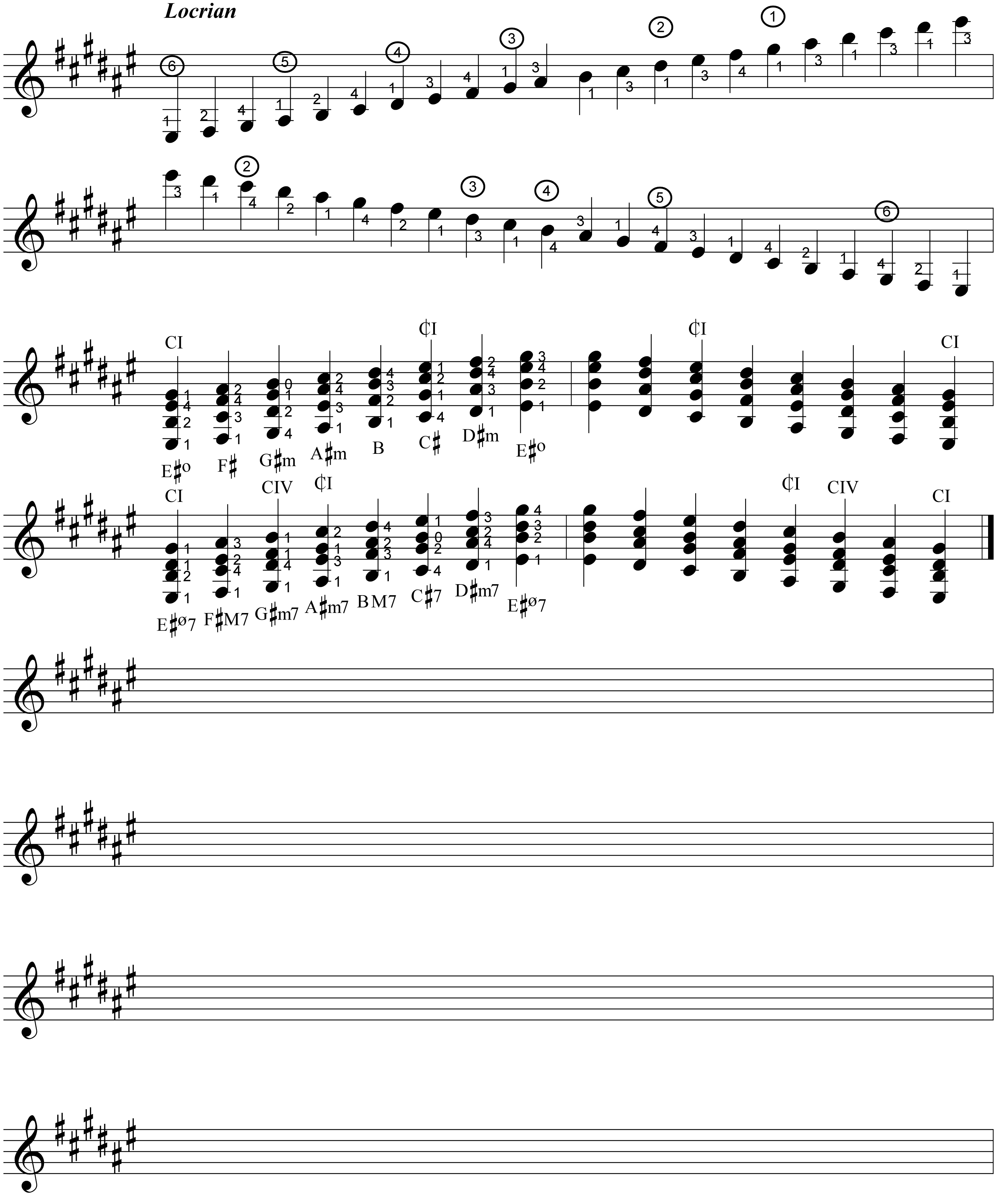


Aeolian (natural minor)




Harmonic minor
D♯m E♯o F♯aug G♯m A♯ B C𝄪o D♯m
D♯mM7 E♯ø7 F♯M7+ G♯m7 A♯7 B M7 C𝄪o7 D♯mM7
Melodic minor
D♯m E♯m F♯aug G♯ A♯ B♯o C𝄪o D♯m D♯m C♯ B A♯m G♯m F♯ E♯ø7 D♯m
D♯mM7 E♯m7 F♯M7+ G♯7 A♯7 B♯ø7 C𝄪ø7 D♯mM7 D♯m7 C♯7 B M7 A♯m7 G♯m7 F♯M7 E♯ø7 D♯m7

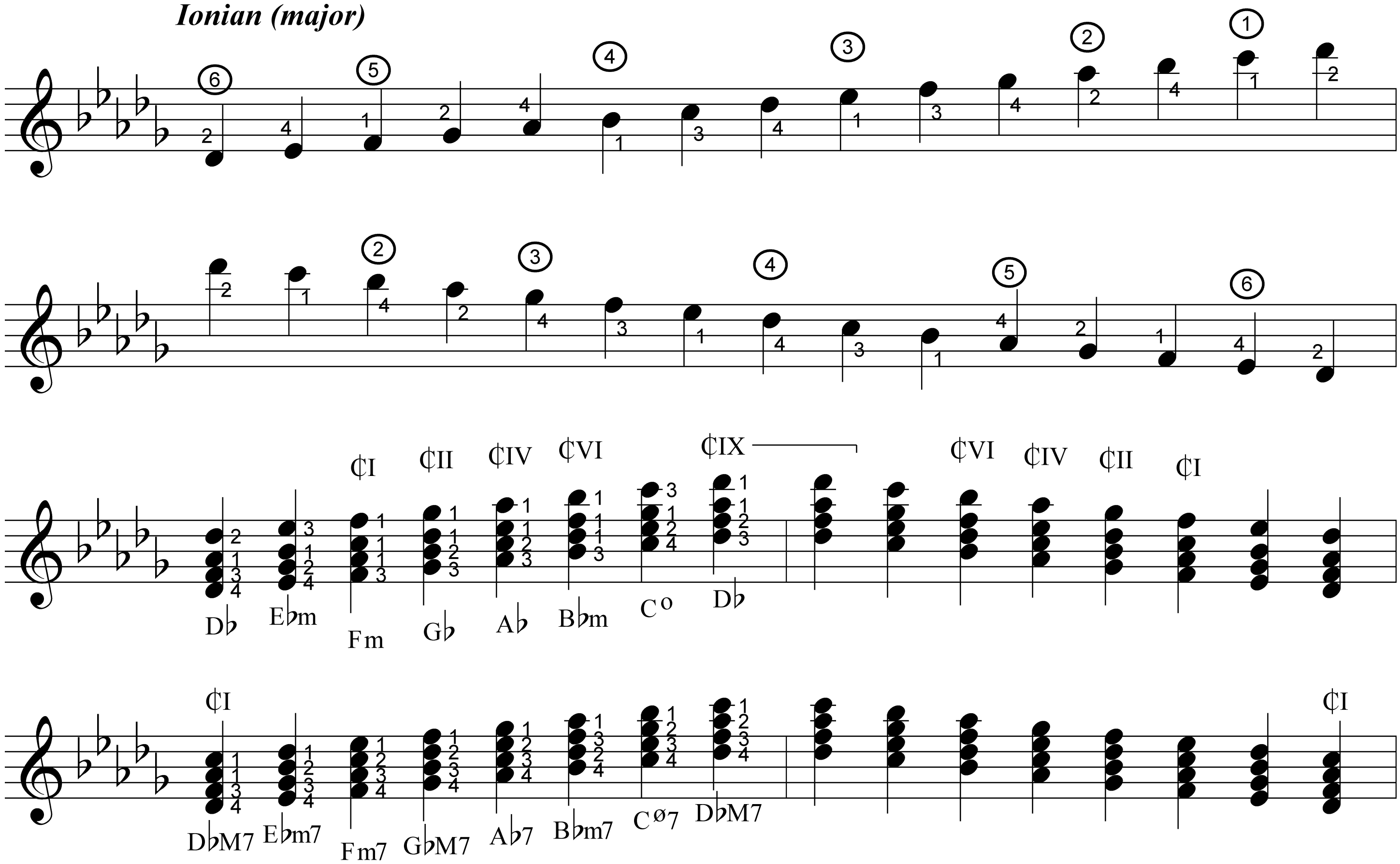
Locrian



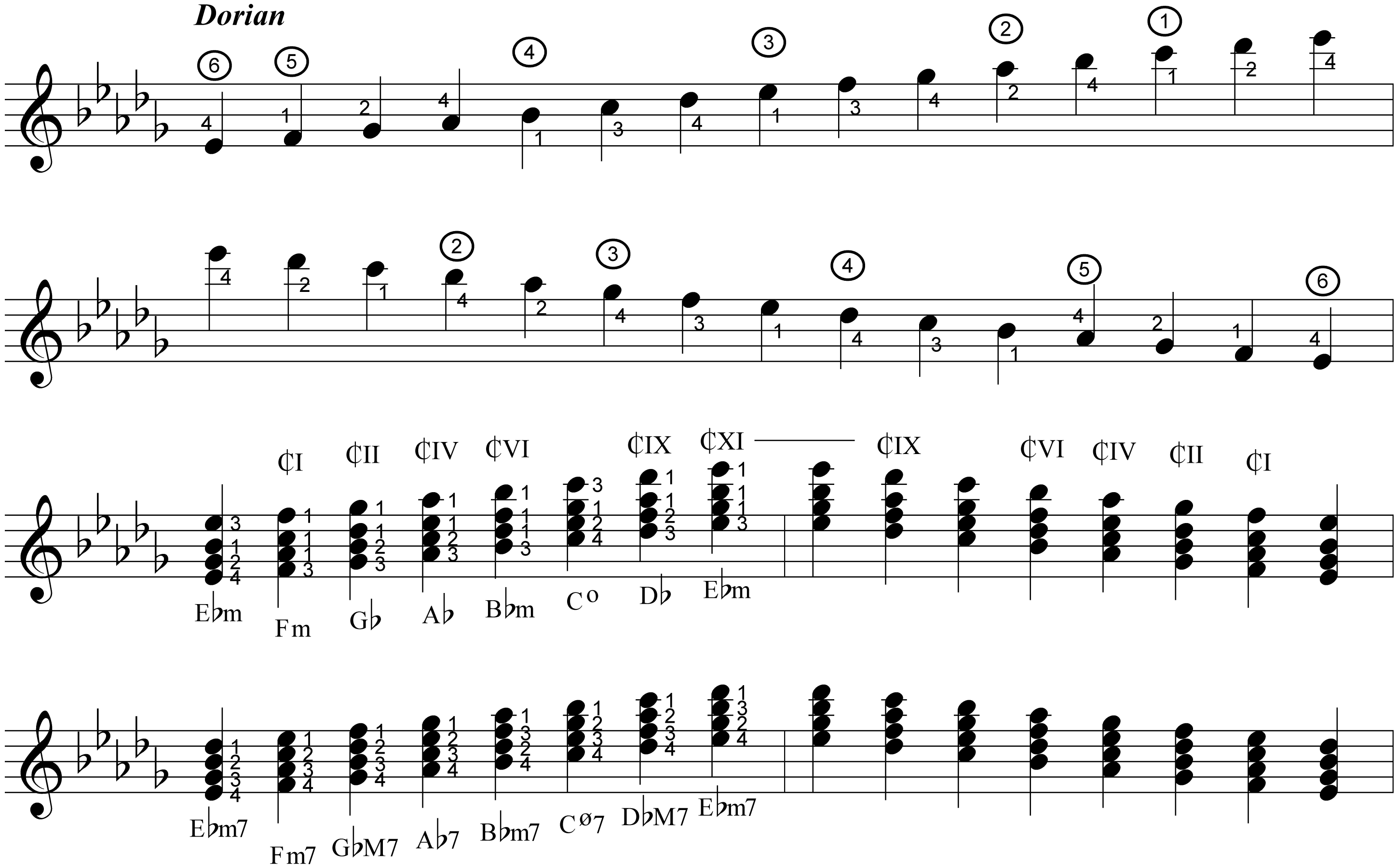
CI
₵I
₵I
CI
E♯o F♯ G♯m A♯m B C♯ D♯m E♯o
CI
CIV
₵I
₵I
CIV
CI
E♯ø7 F♯M7 G♯m7 A♯m7 BM7 C♯7 D♯m7 E♯ø7

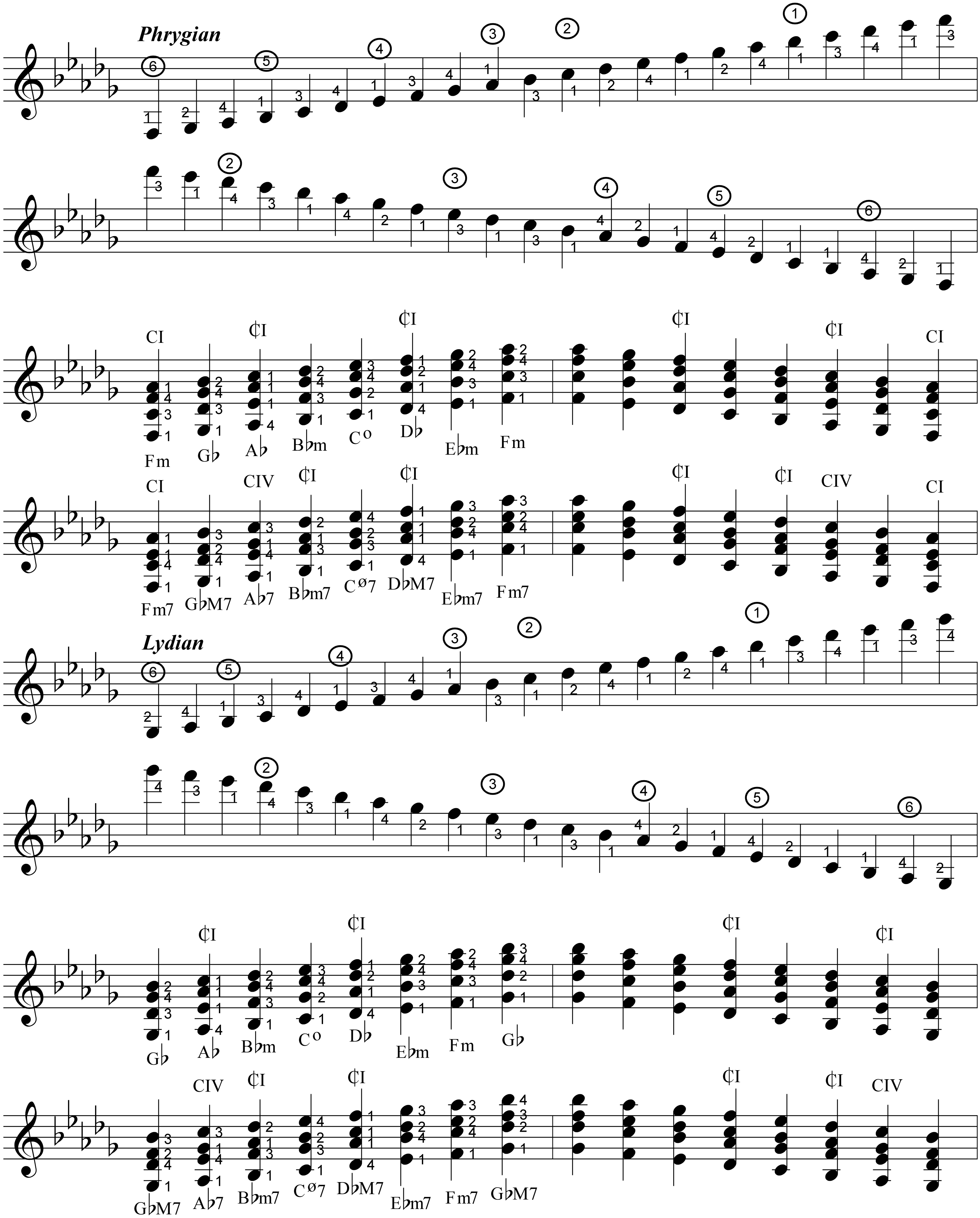
Modal and Minor Scales (five flats)

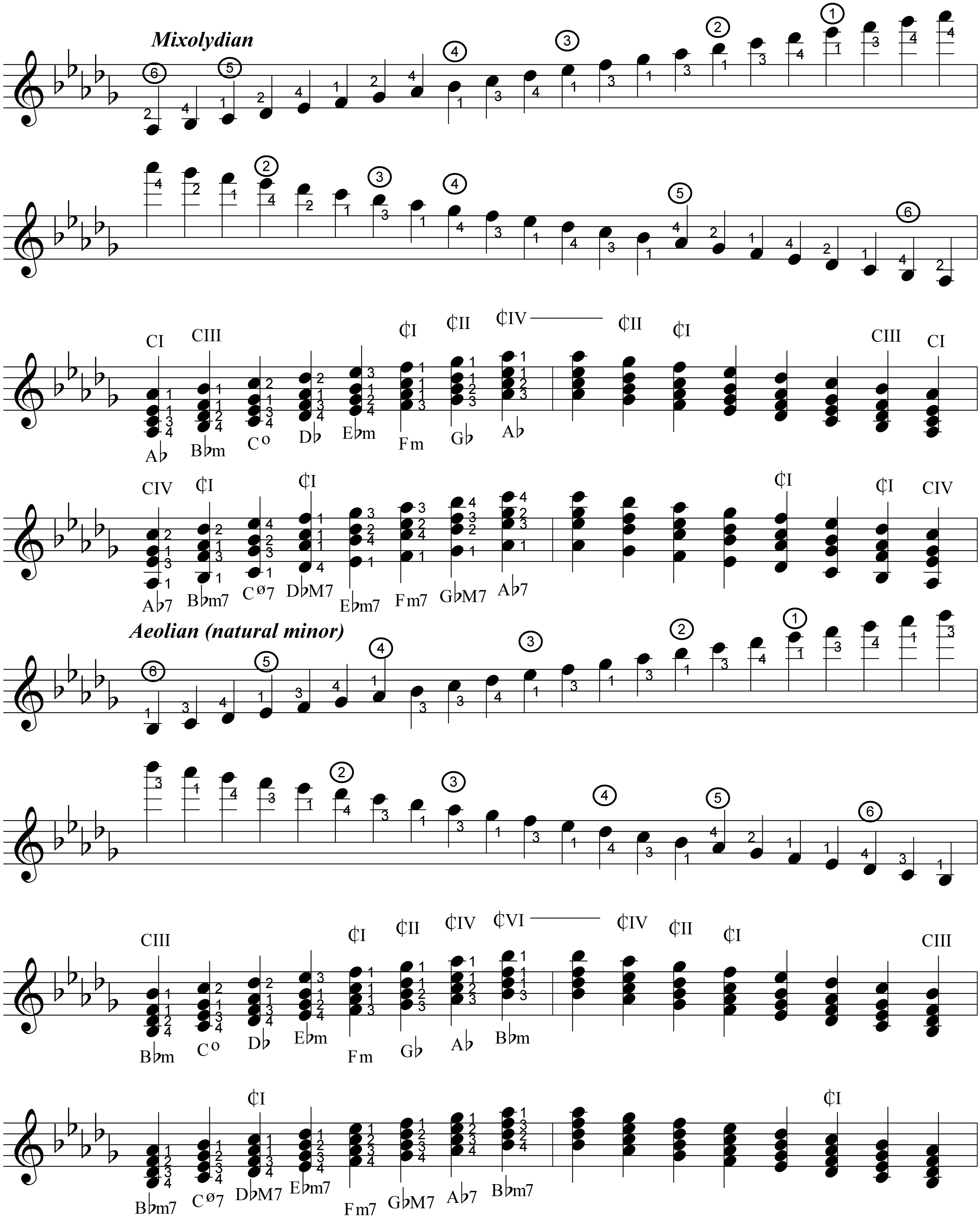
Ionian (major)

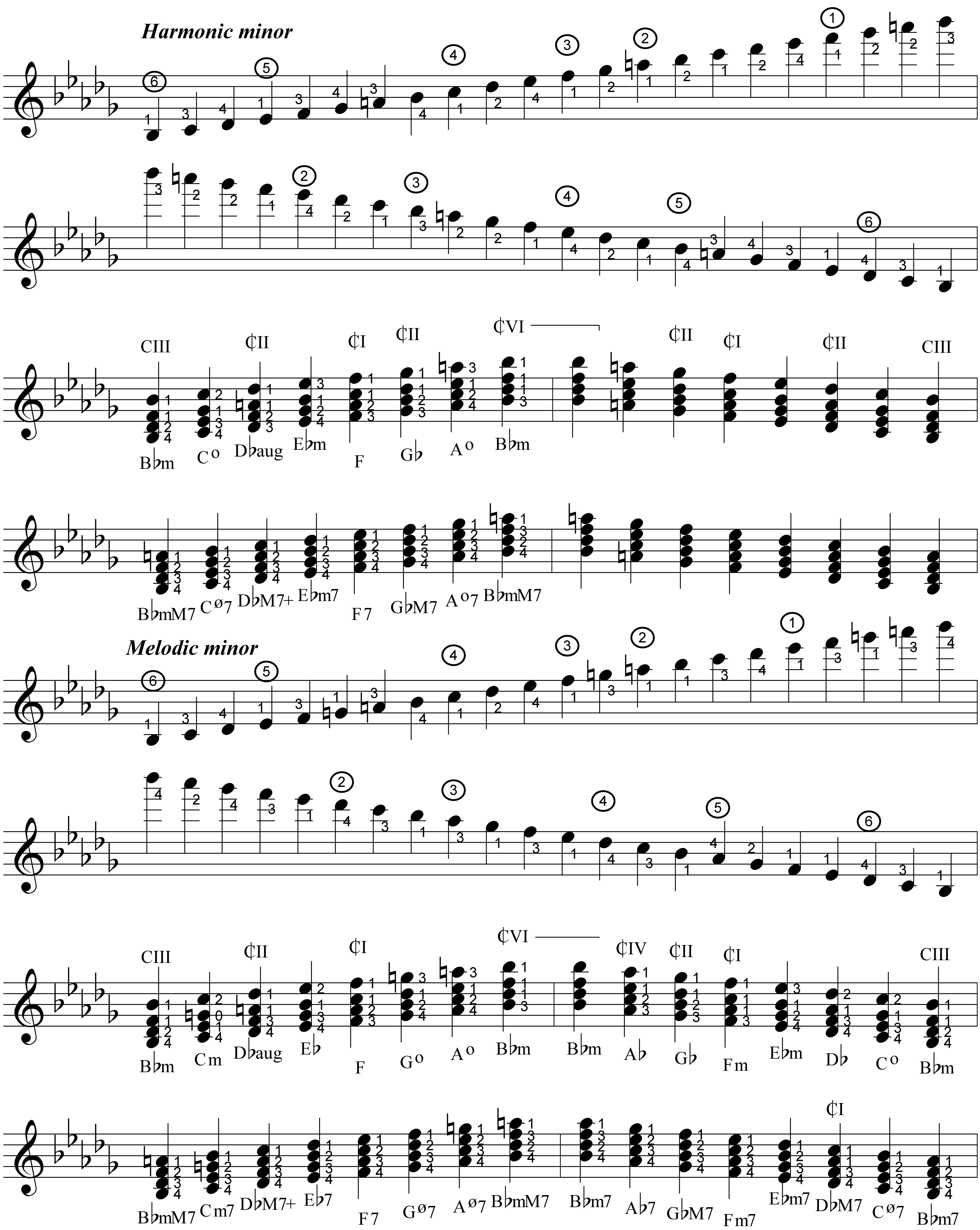


Dorian

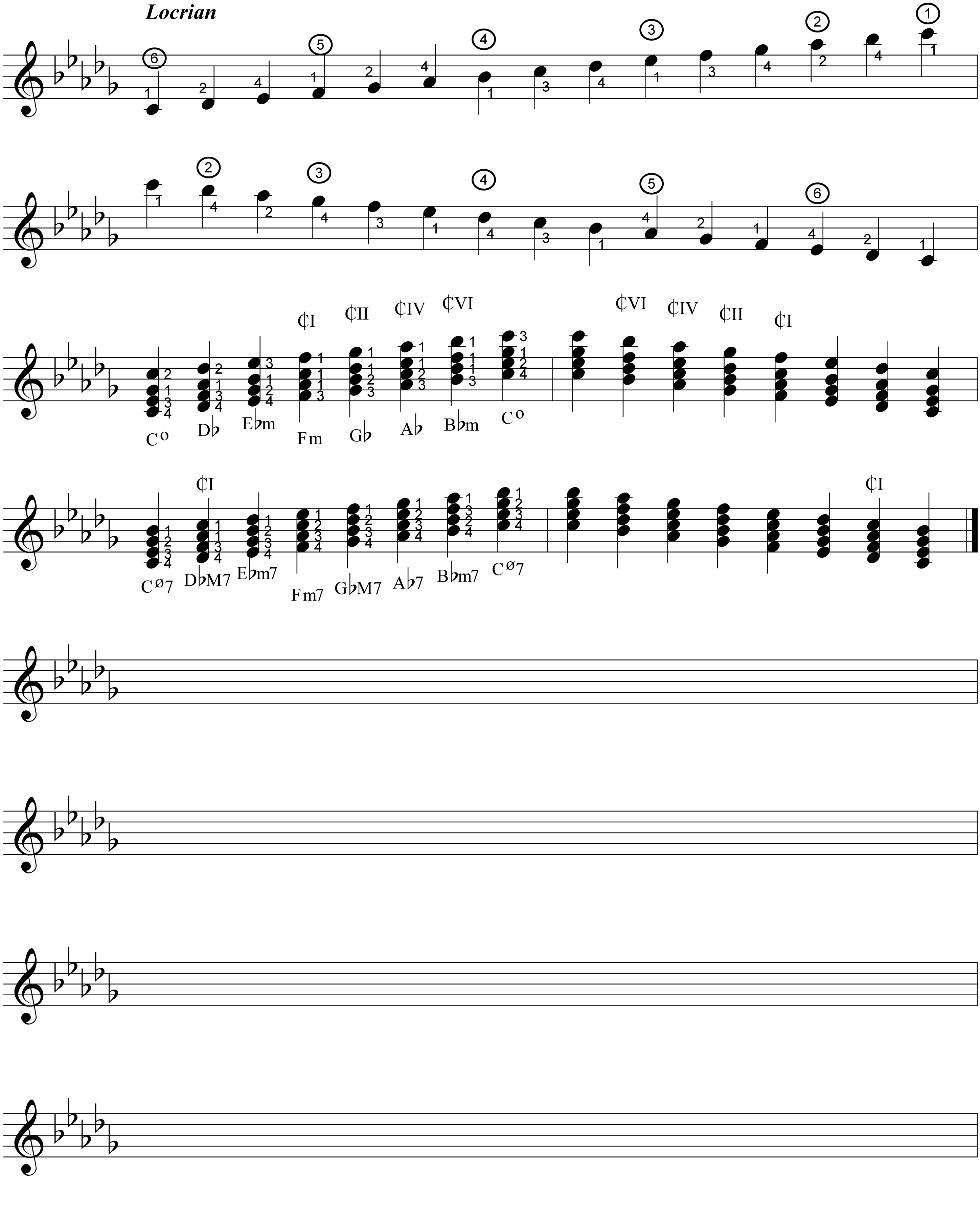



Phrygian
CI ¢I ¢I ¢I ¢I CI
Fm G♭ A♭ B♭m Co D♭ E♭m Fm
CI CIV ¢I ¢I ¢I ¢I CIV CI
Fm7 G♭M7 A♭7 B♭m7 Cø7 D♭M7 E♭m7 Fm7
Lydian
¢I ¢I ¢I ¢I
G♭ A♭ B♭m Co D♭ E♭m Fm G♭
CIV ¢I ¢I ¢I ¢I CIV
G♭M7 A♭7 B♭m7 Cø7 D♭M7 E♭m7 Fm7 G♭M7


Mixolydian
CI CIII ₵I ₵II ₵IV ₵II ₵I CIII CI
A♭ B♭m Cº D♭ E♭m Fm G♭ A♭
CIV ₵I ₵I ₵I ₵I CIV
A♭7 B♭m7 Cø7 D♭M7 E♭m7 Fm7 G♭M7 A♭7
Aeolian (natural minor)
CIII ₵I ₵II ₵IV ₵VI ₵IV ₵II ₵I CIII
B♭m Cº D♭ E♭m Fm G♭ A♭ B♭m
₵I ₵I
B♭m7 Cø7 D♭M7 E♭m7 Fm7 G♭M7 A♭7 B♭m7

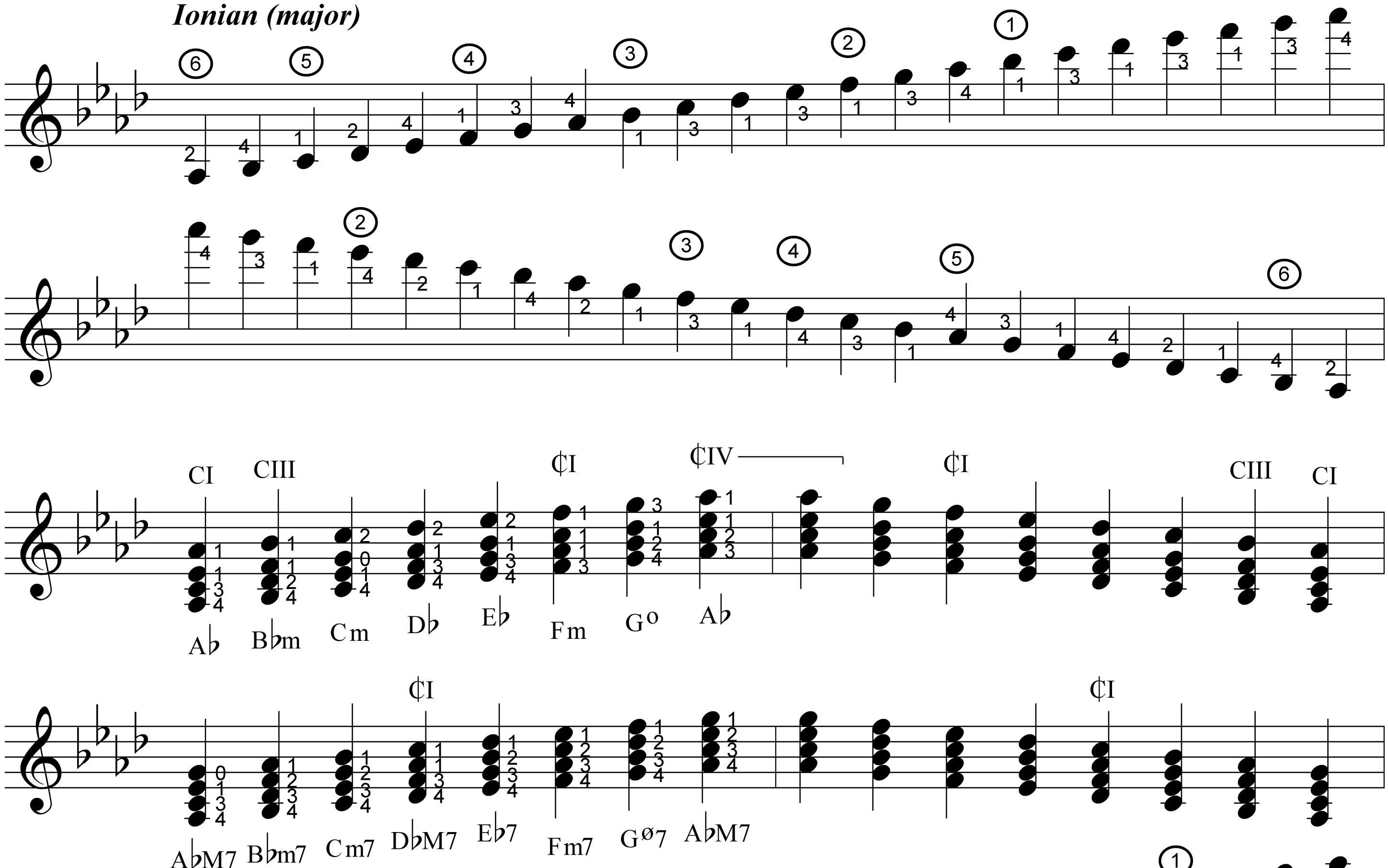

Harmonic minor
CIII ¢II ¢I ¢II ¢VI ¢II ¢I ¢II CIII
B♭m Co D♭aug E♭m F G♭ Ao B♭m
B♭mM7 Cø7 D♭M7+ E♭m7 F7 G♭M7 Ao7 B♭mM7
Melodic minor
CIII ¢II ¢I ¢VI ¢IV ¢II ¢I CIII
B♭m Cm D♭aug E♭ F Go Ao B♭m B♭m A♭ G♭ Fm E♭m D♭ Co B♭m
¢I
B♭mM7 Cm7 D♭M7+ E♭7 F7 Gø7 Aø7 B♭mM7 B♭m7 A♭7 G♭M7 Fm7 E♭m7 D♭M7 Cø7 B♭m7

Locrian

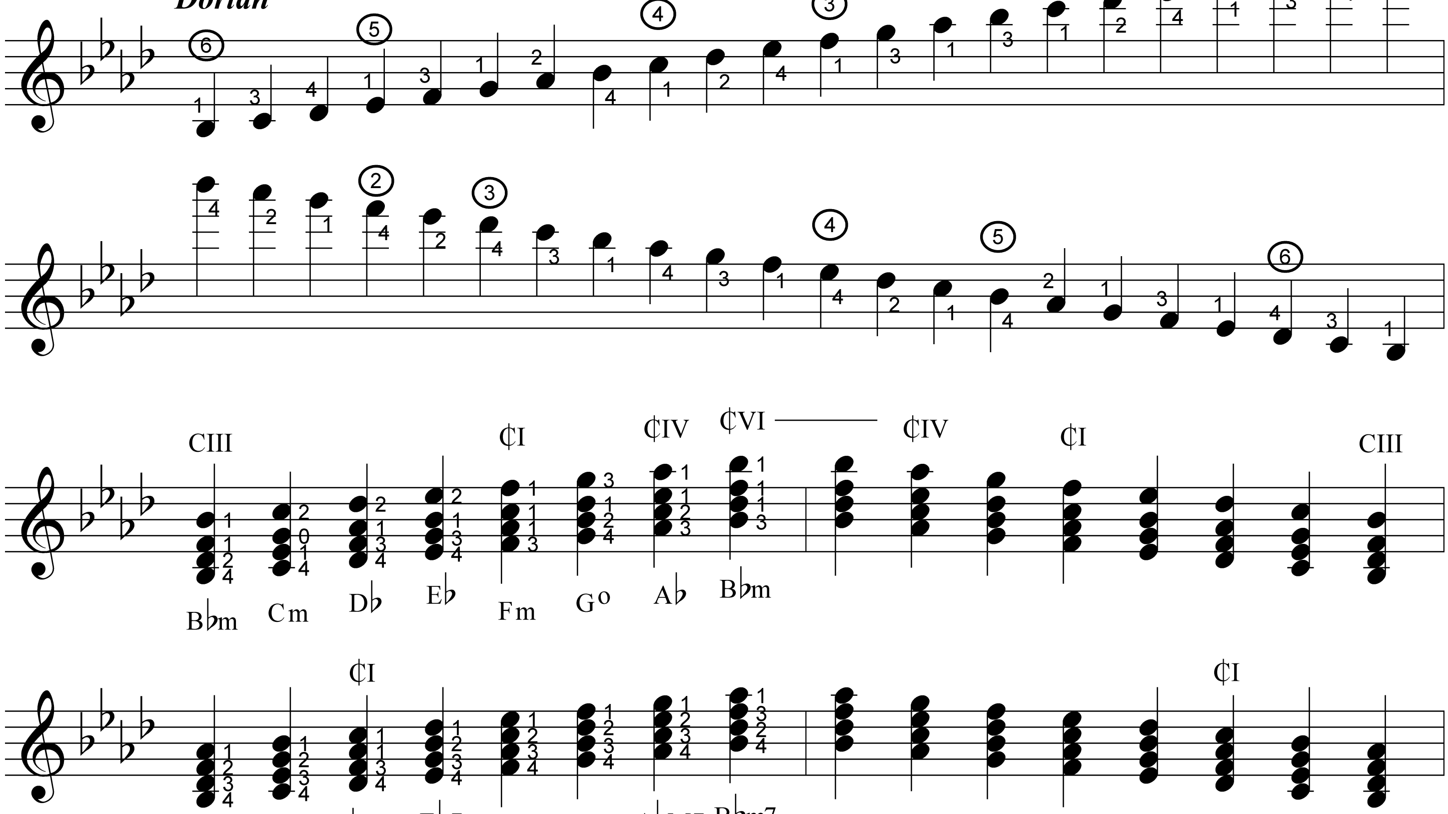

¢I ¢II ¢IV ¢VI ¢VI ¢IV ¢II ¢I
C° D♭ E♭m Fm G♭ A♭ B♭m C°
¢I ¢I
Cø7 D♭M7 E♭m7 Fm7 G♭M7 A♭7 B♭m7 Cø7

Modal and Minor Scales (four flats)

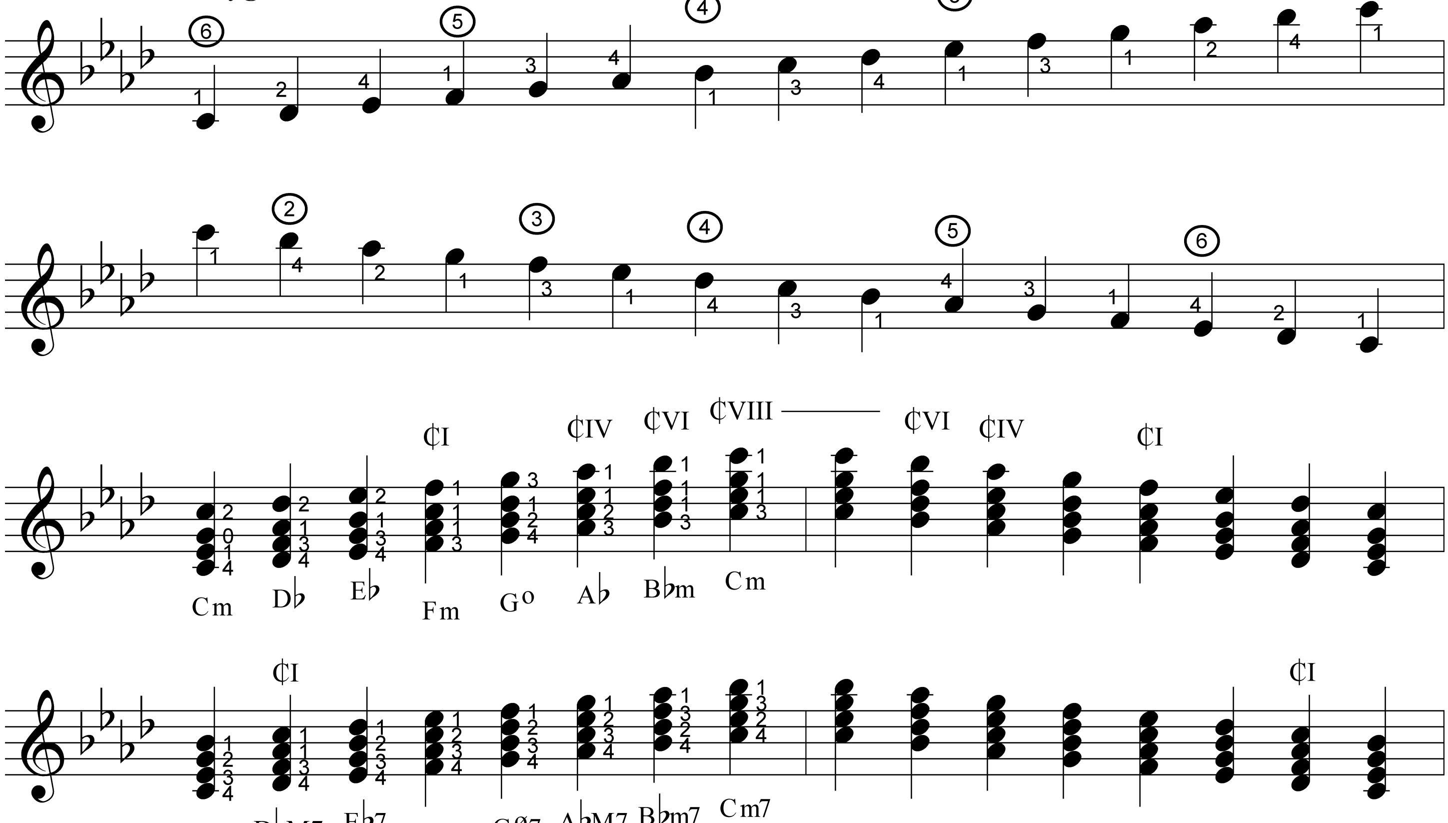
Ionian (major)



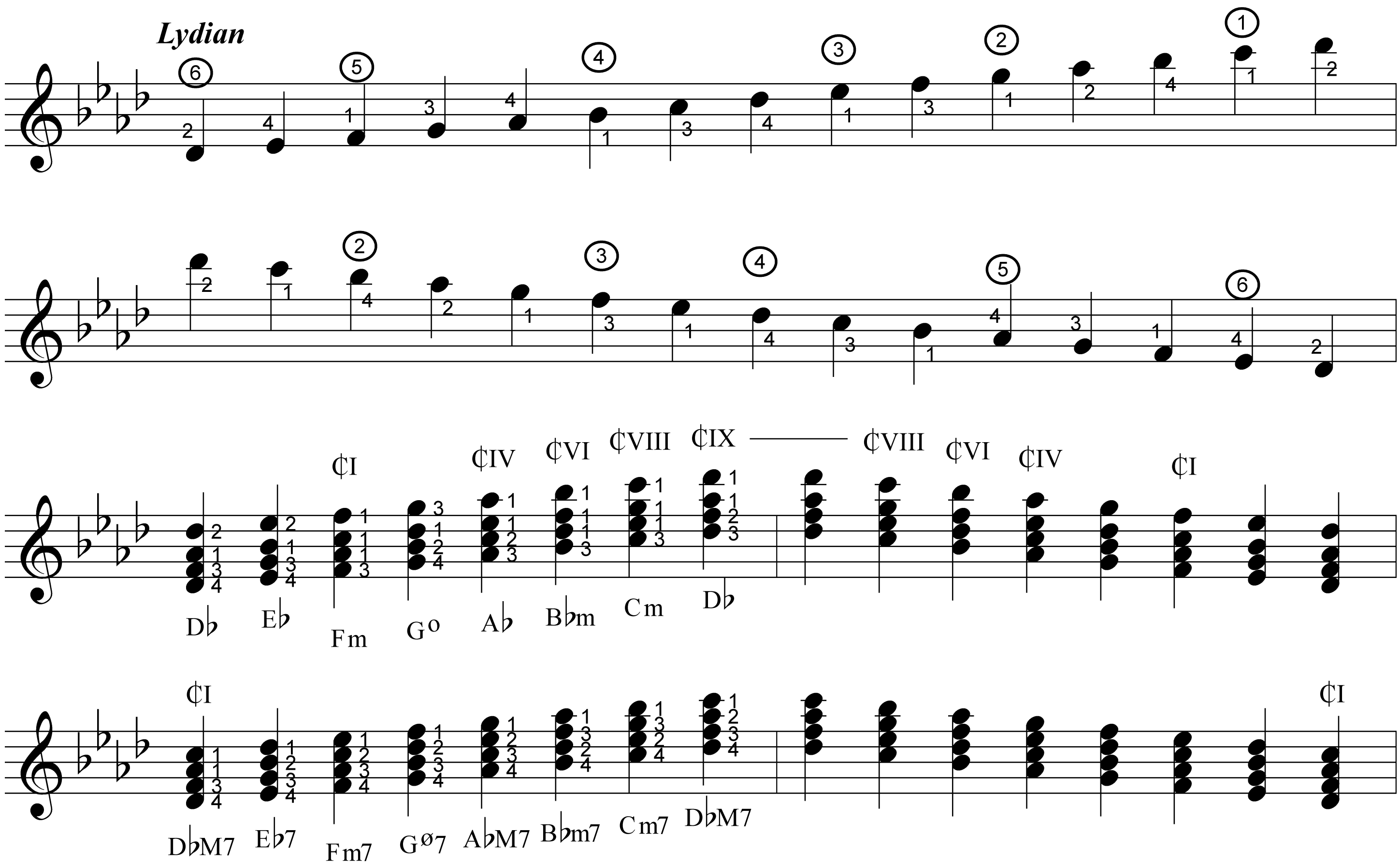
Dorian



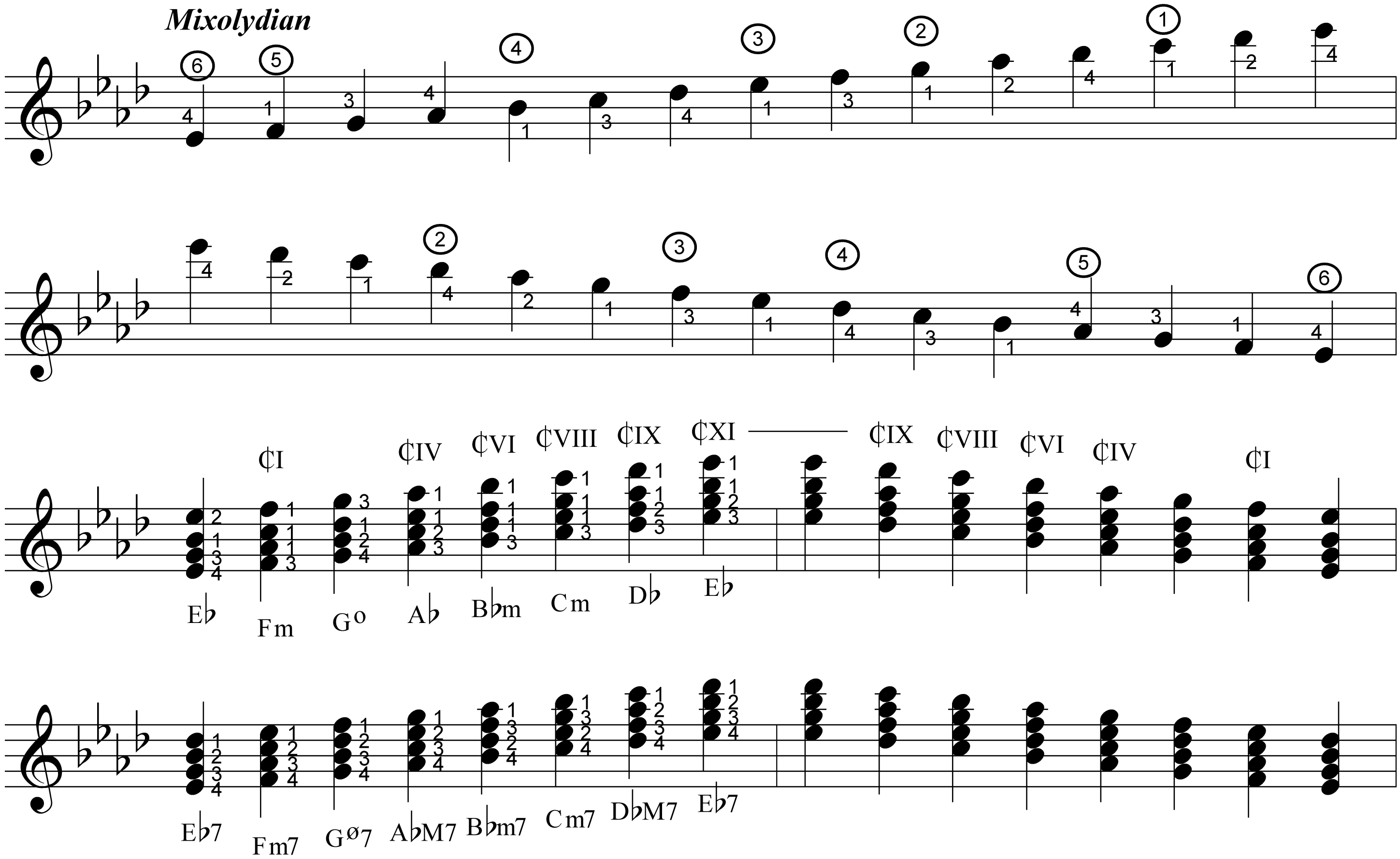
Phrygian



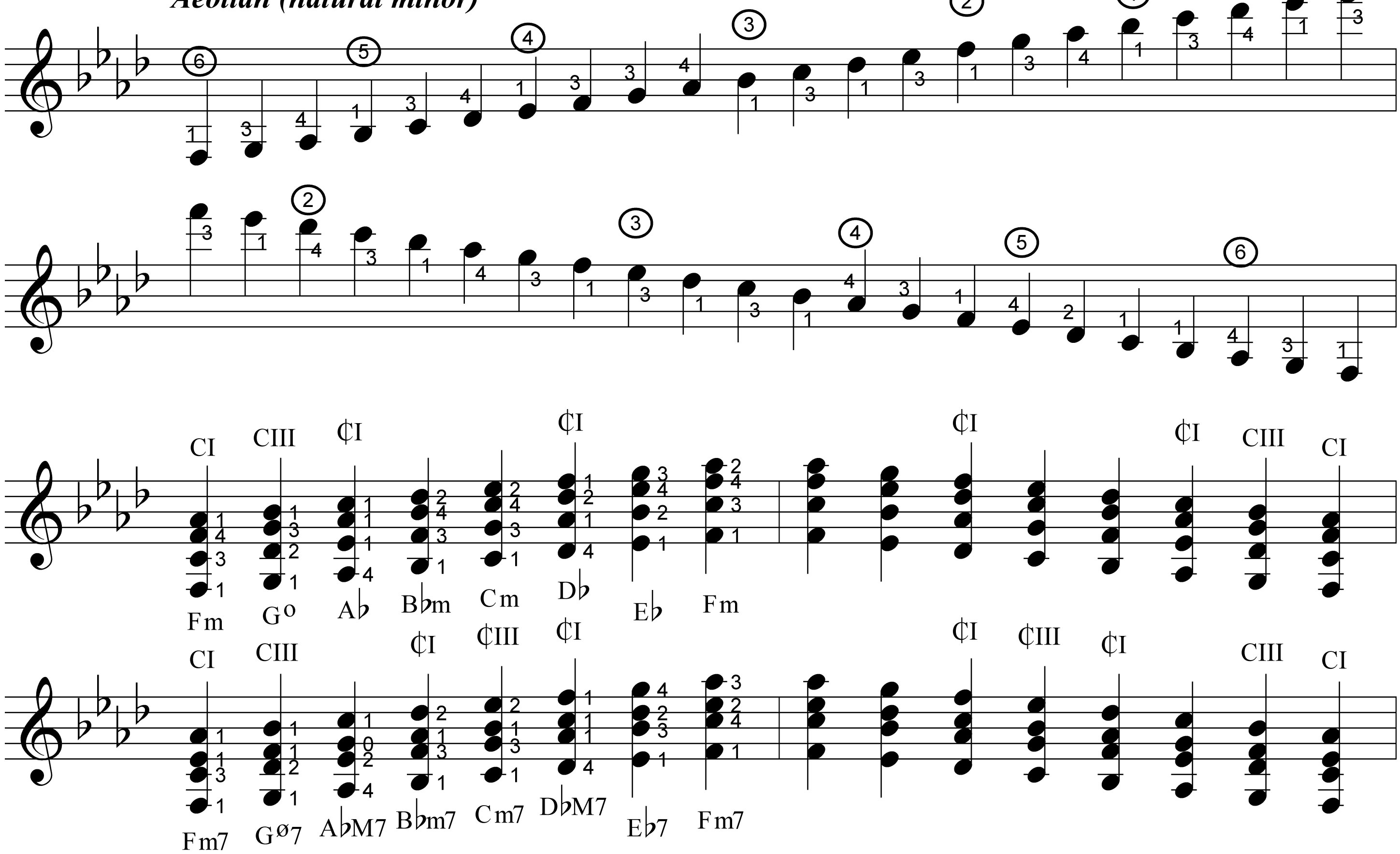
Lydian



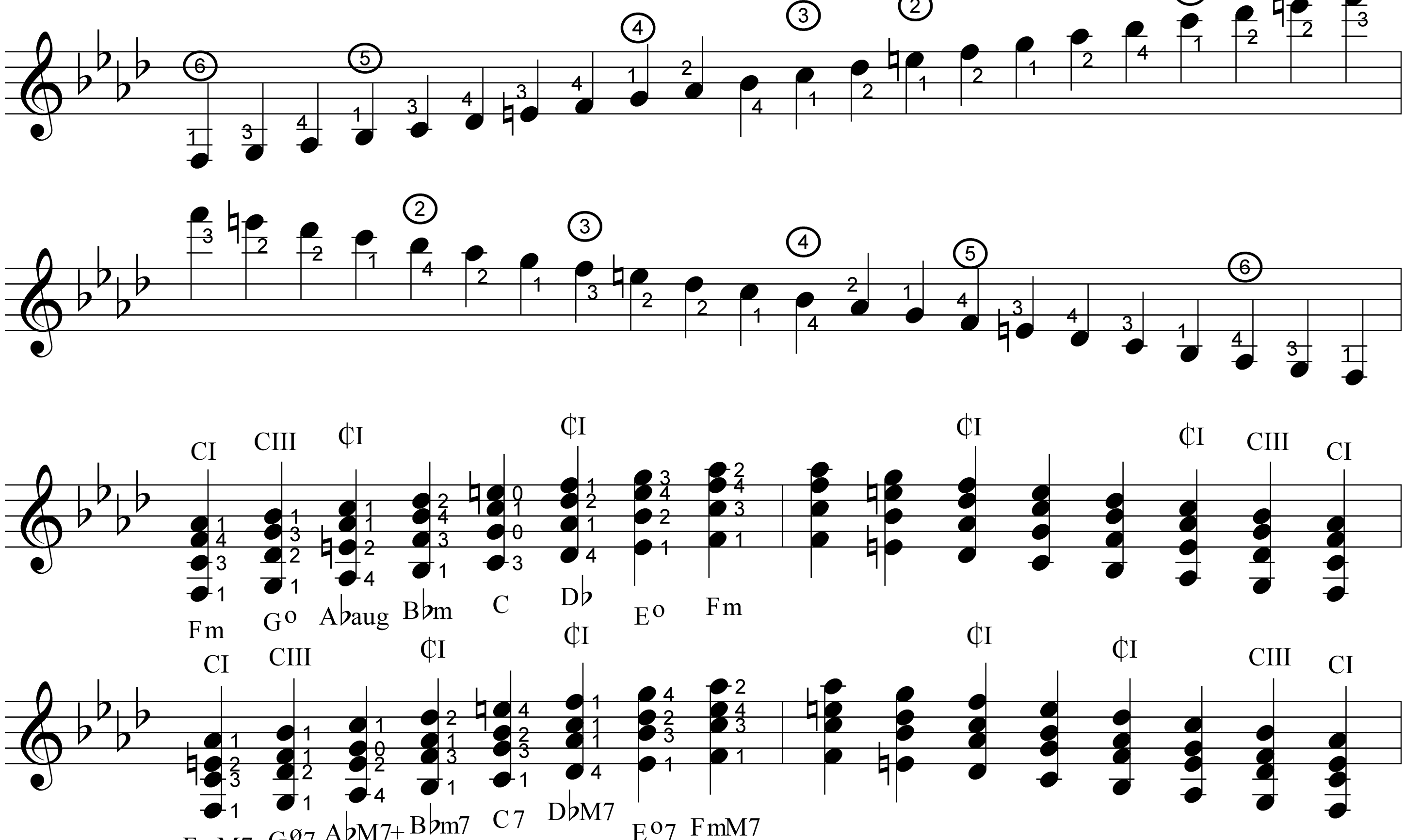
Mixolydian



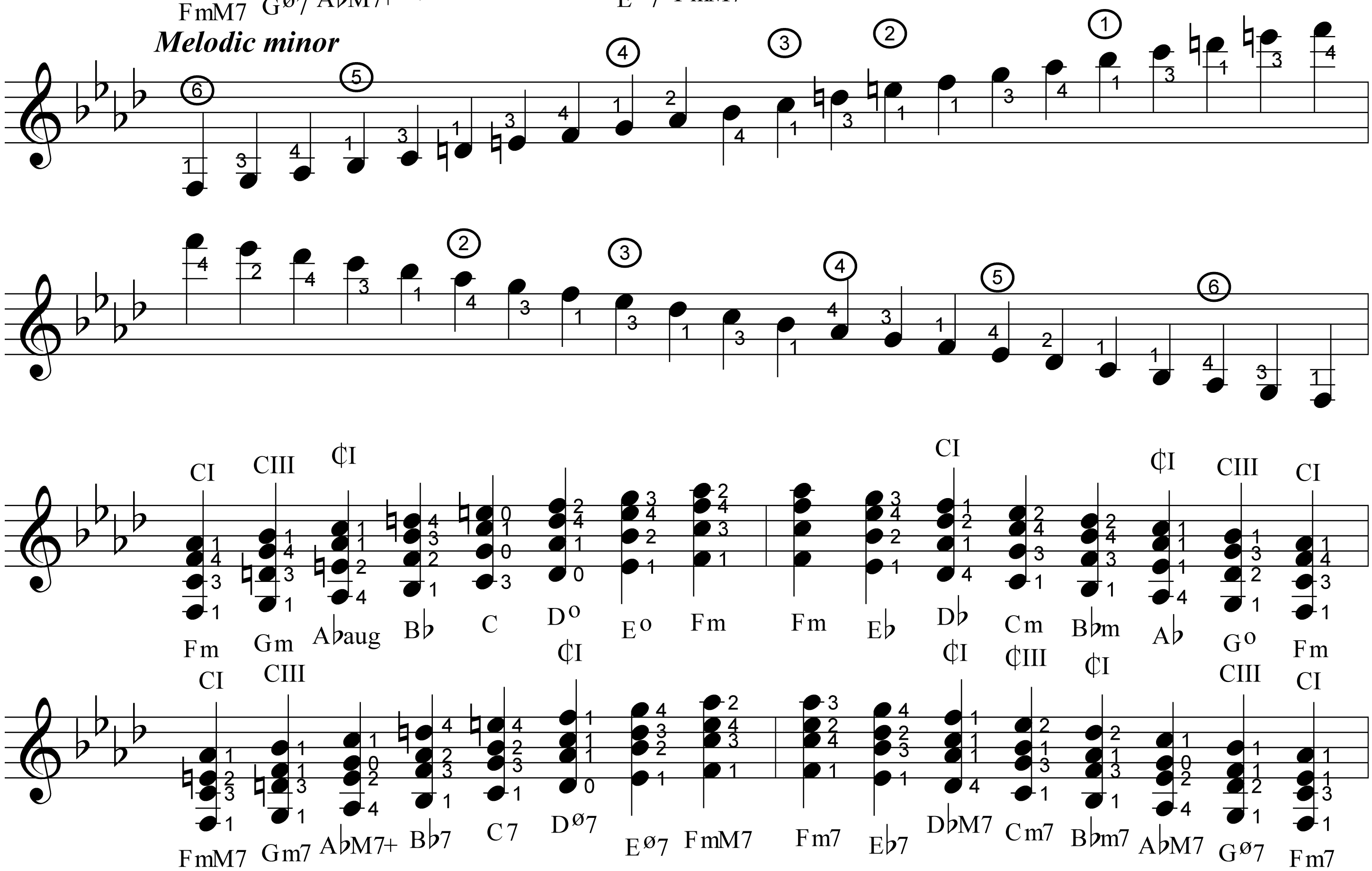
Aeolian (natural minor)



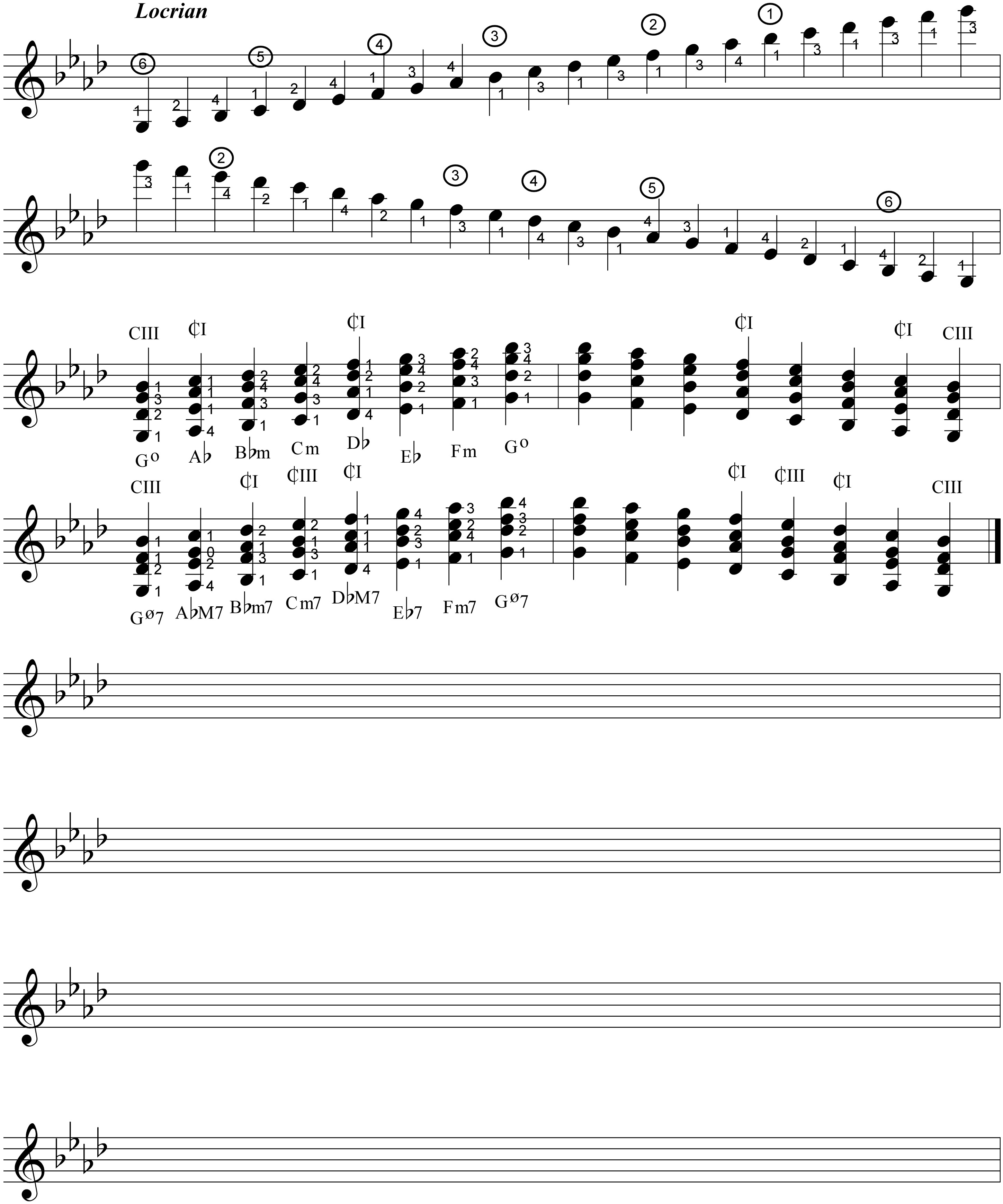
Harmonic minor



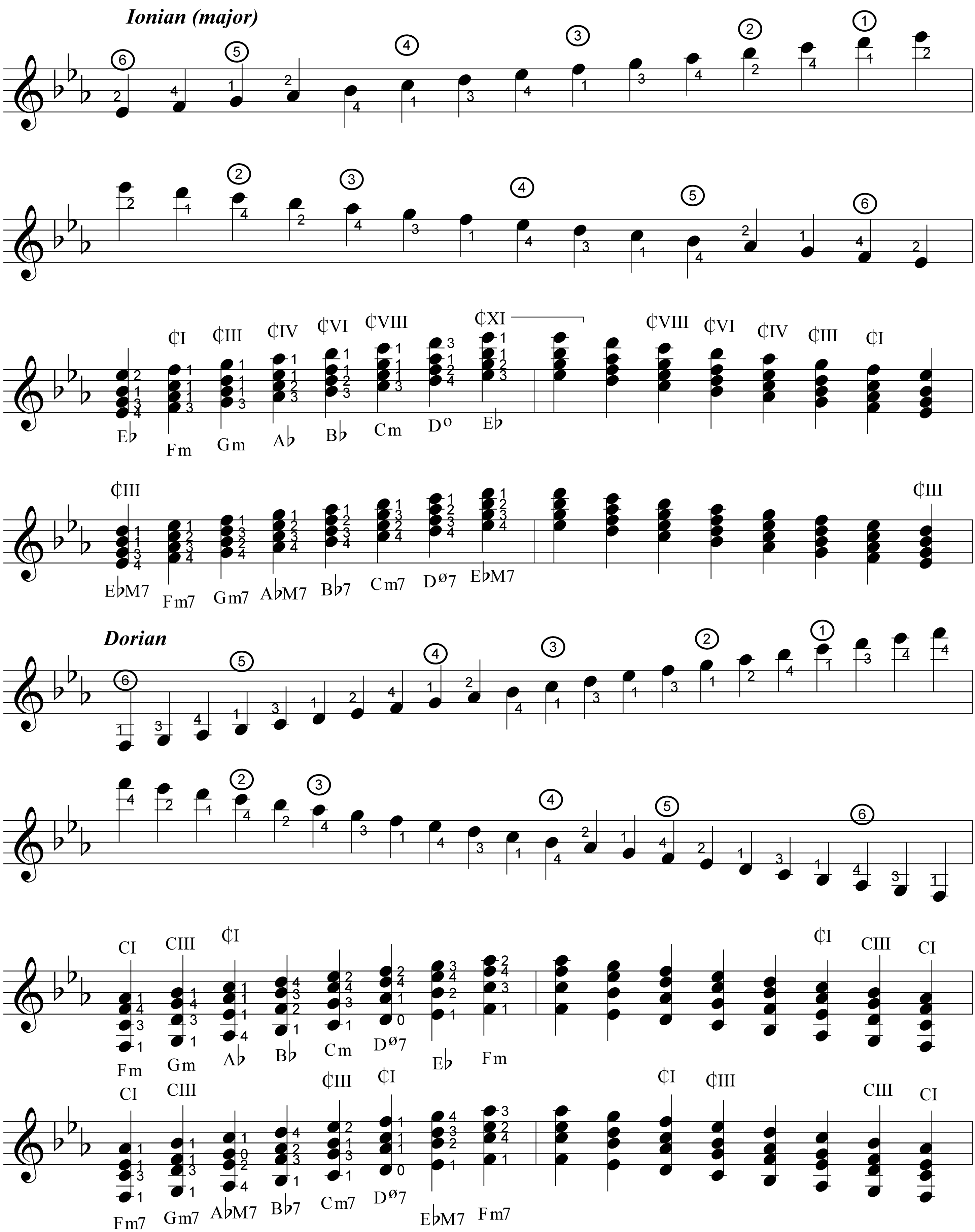
Melodic minor

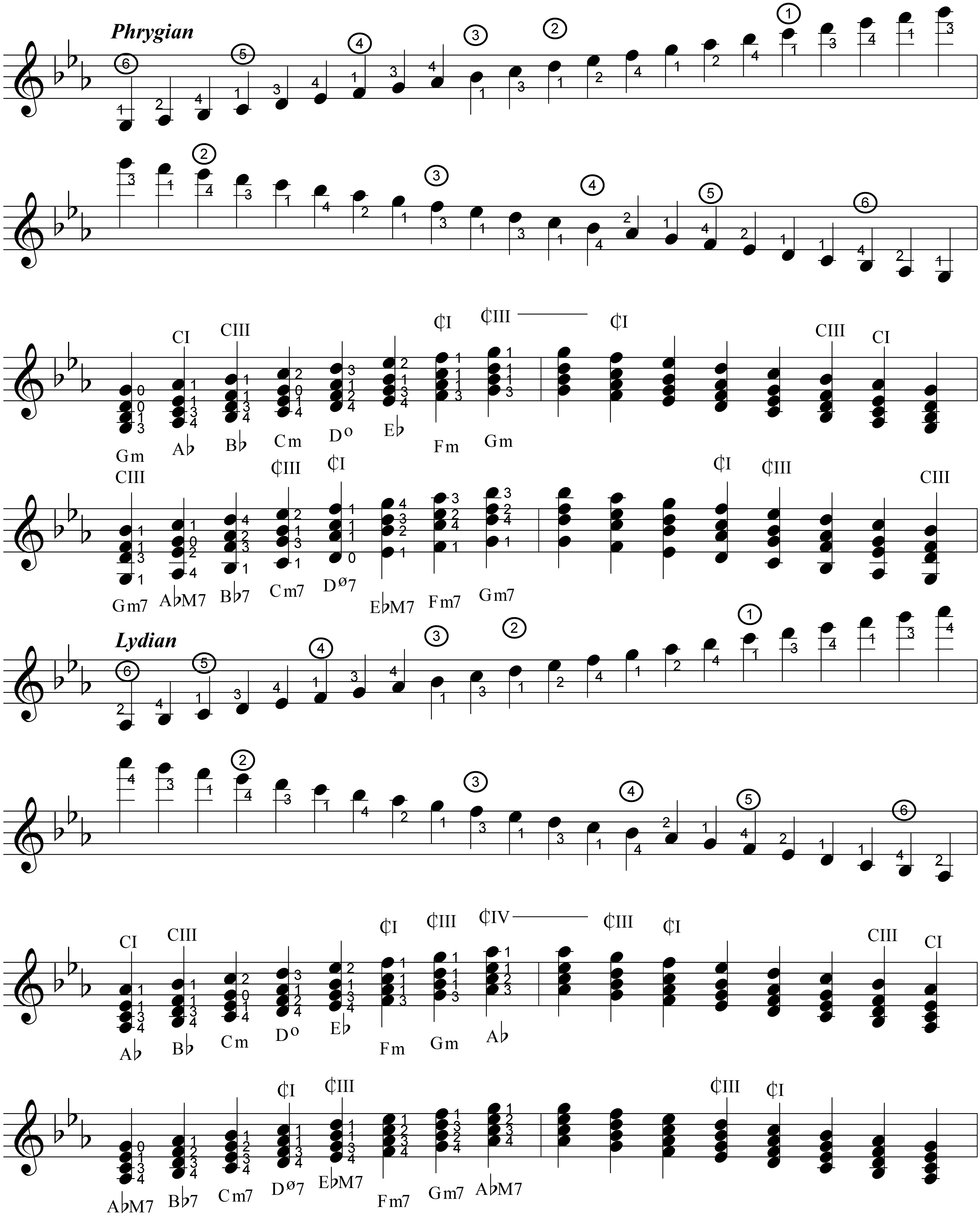


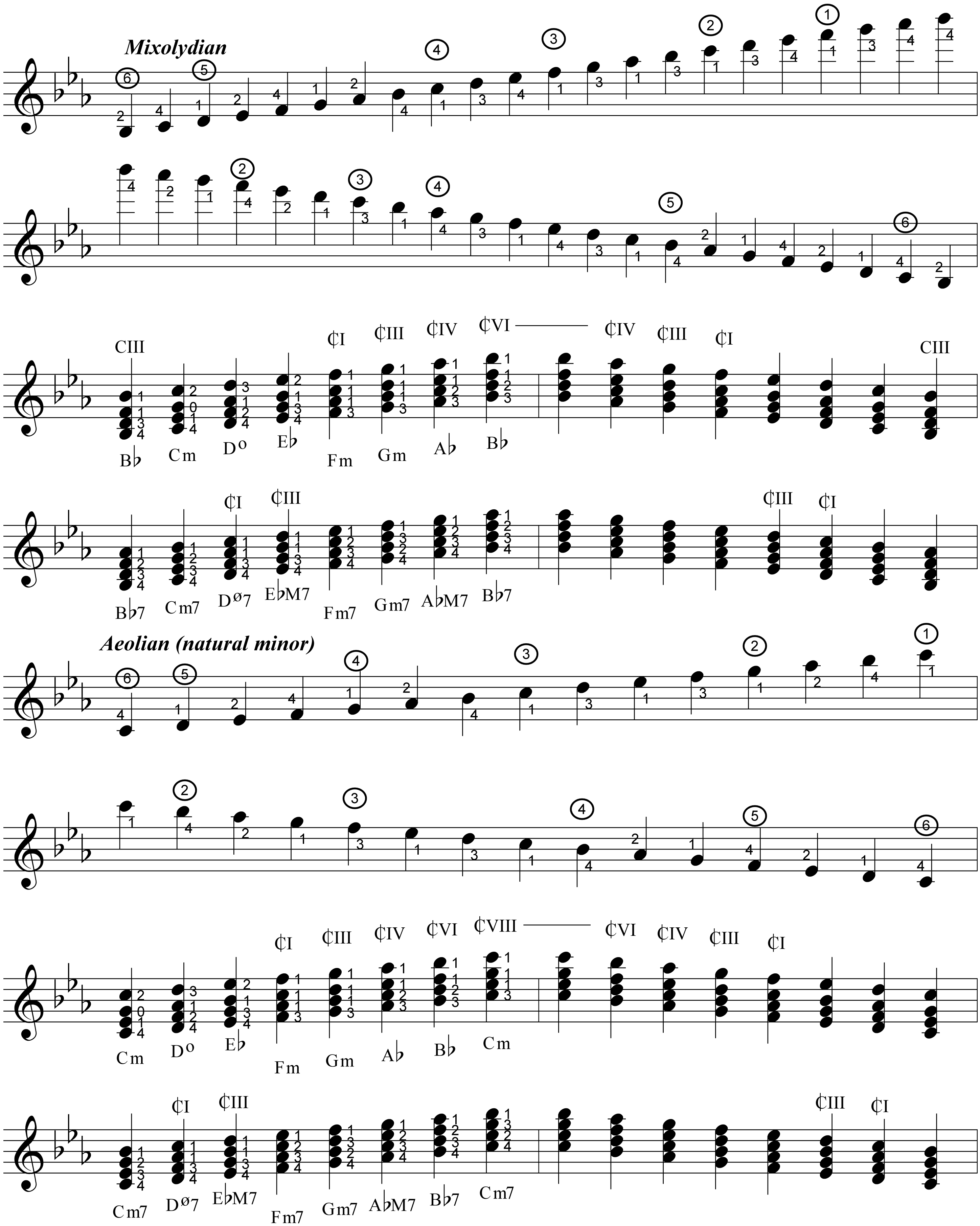
Locrian


CIII ¢I ¢I ¢I ¢I CIII
Go A♭ B♭m Cm D♭ E♭ Fm Go
CIII ¢I ¢III ¢I ¢I ¢III ¢I CIII
Gø7 A♭M7 B♭m7 Cm7 D♭M7 E♭7 Fm7 Gø7

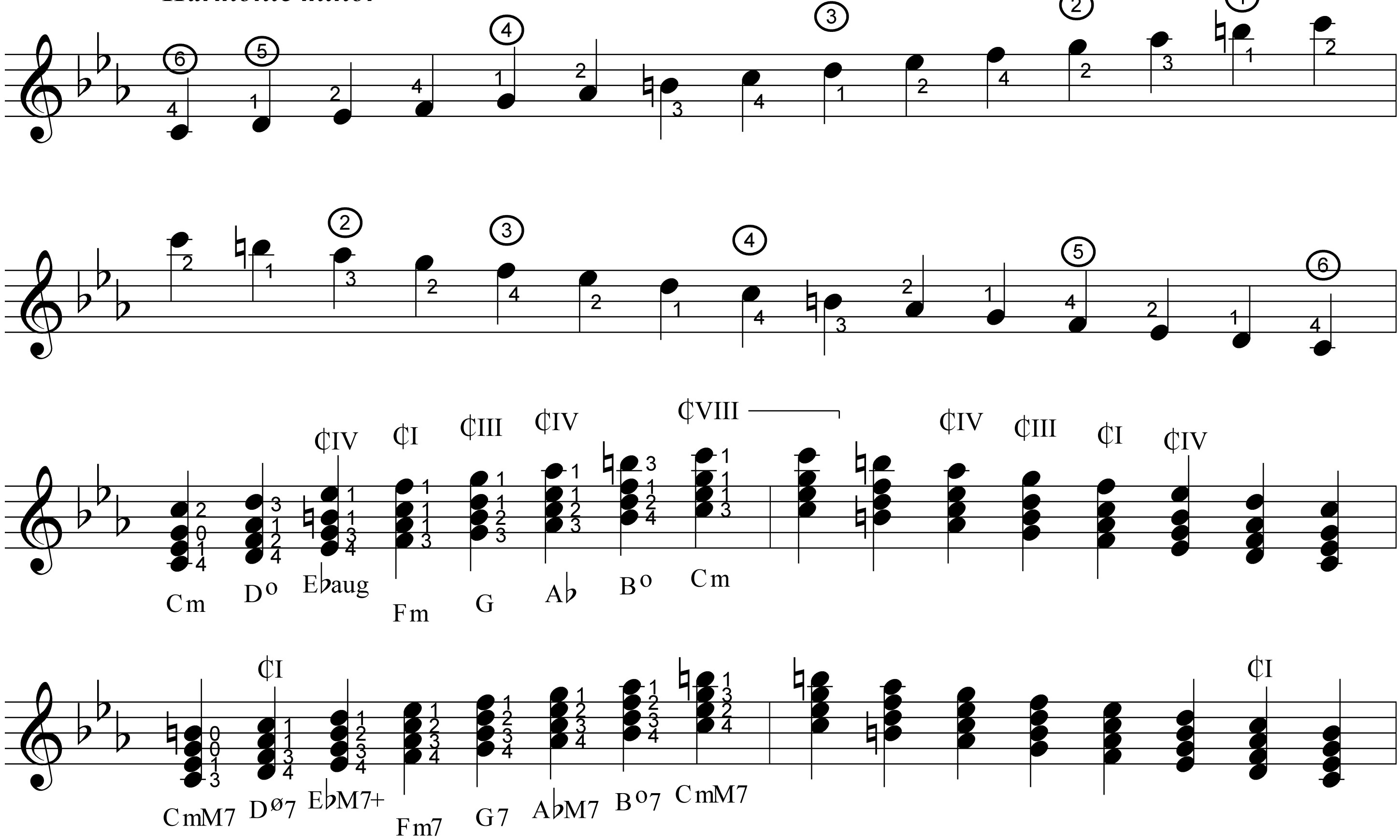
Modal and Minor Scales (three flats)



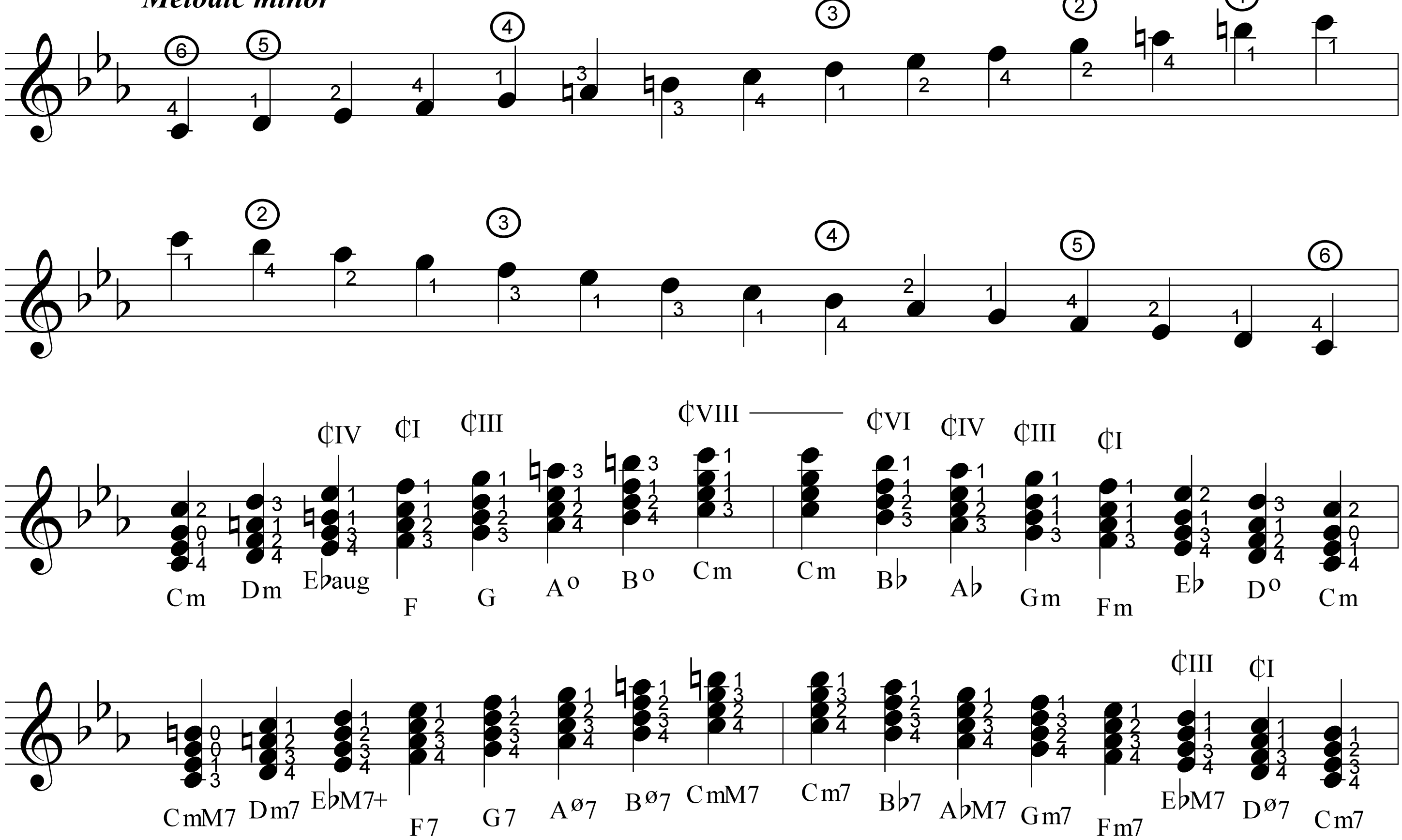

Phrygian
CI CIII ₵I ₵III ₵I CIII CI
Gm A♭ B♭ Cm Dº E♭ Fm Gm
CIII ₵III ₵I ₵I ₵III CIII
Gm7 A♭M7 B♭7 Cm7 Dø7 E♭M7 Fm7 Gm7
Lydian
CI CIII ₵I ₵III ₵IV ₵III ₵I CIII CI
A♭ B♭ Cm Dº E♭ Fm Gm A♭
₵I ₵III ₵III ₵I
A♭M7 B♭7 Cm7 Dø7 E♭M7 Fm7 Gm7 A♭M7


Mixolydian
CIII
¢I ¢III ¢IV ¢VI ¢IV ¢III ¢I
CIII
B♭ Cm D° E♭ Fm Gm A♭ B♭
¢I ¢III ¢III ¢I
B♭7 Cm7 Dø7 E♭M7 Fm7 Gm7 A♭M7 B♭7
Aeolian (natural minor)
¢I ¢III ¢IV ¢VI ¢VIII ¢VI ¢IV ¢III ¢I
Cm D° E♭ Fm Gm A♭ B♭ Cm
¢I ¢III ¢III ¢I
Cm7 Dø7 E♭M7 Fm7 Gm7 A♭M7 B♭7 Cm7

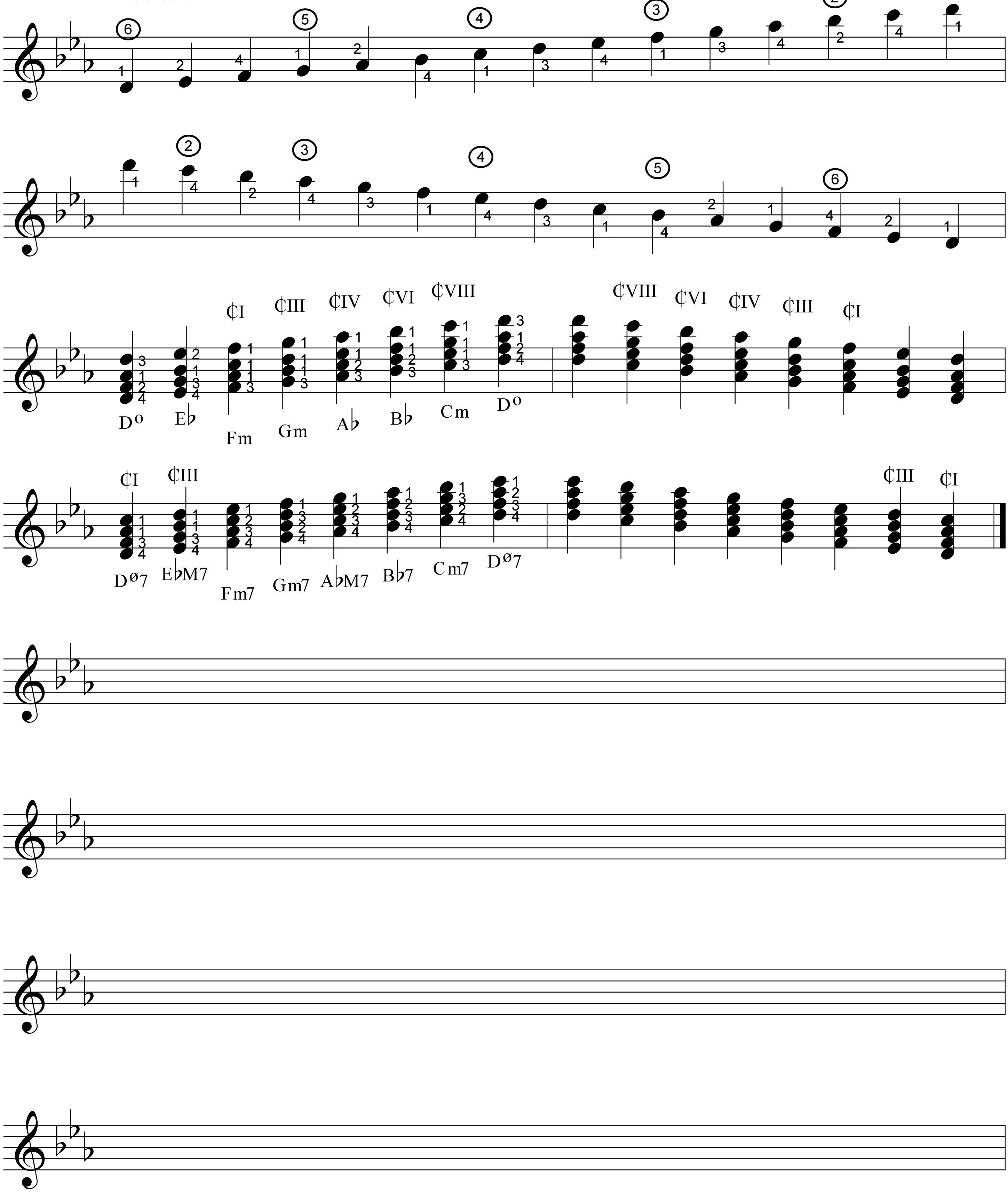
Harmonic minor



Melodic minor

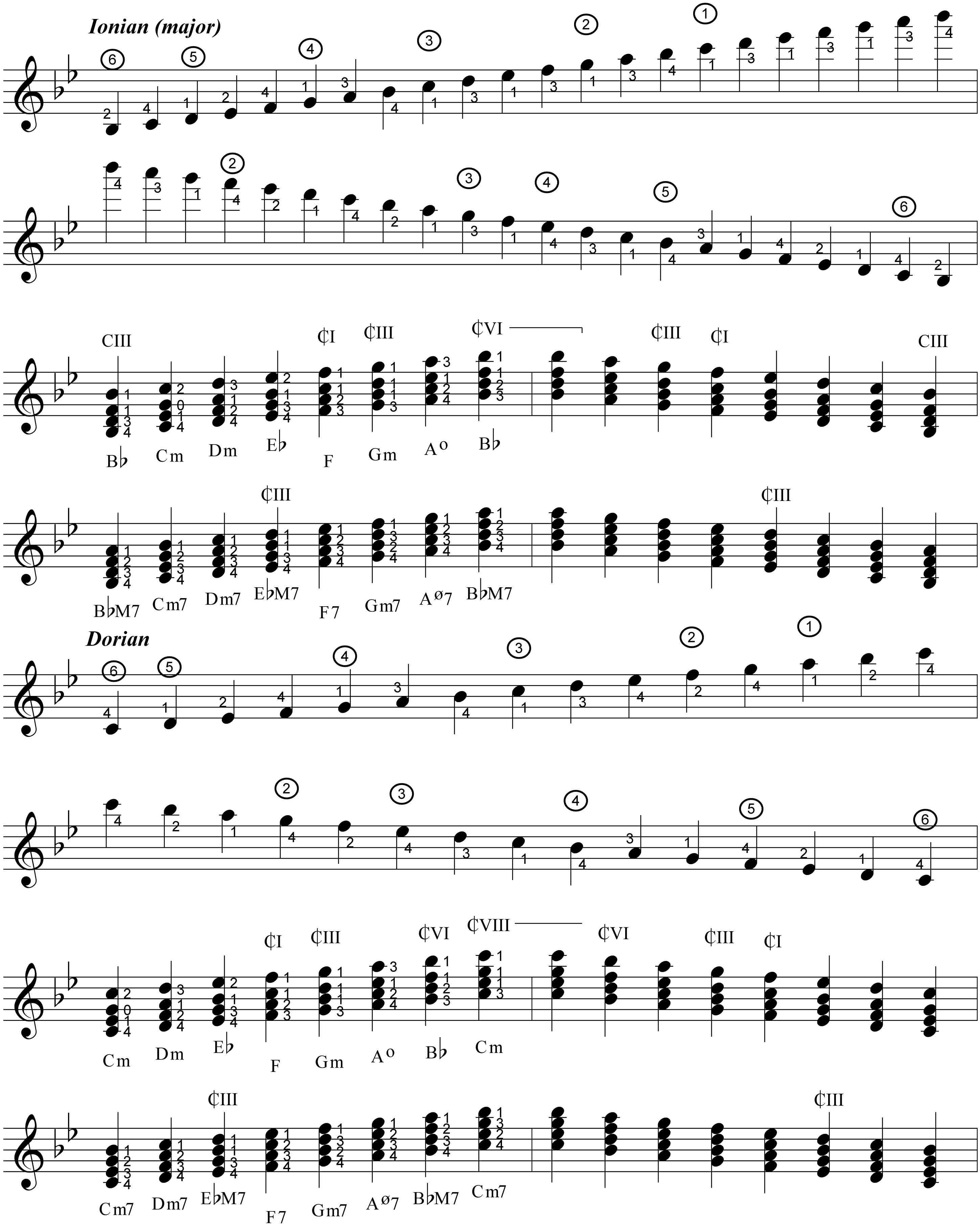


Locrian

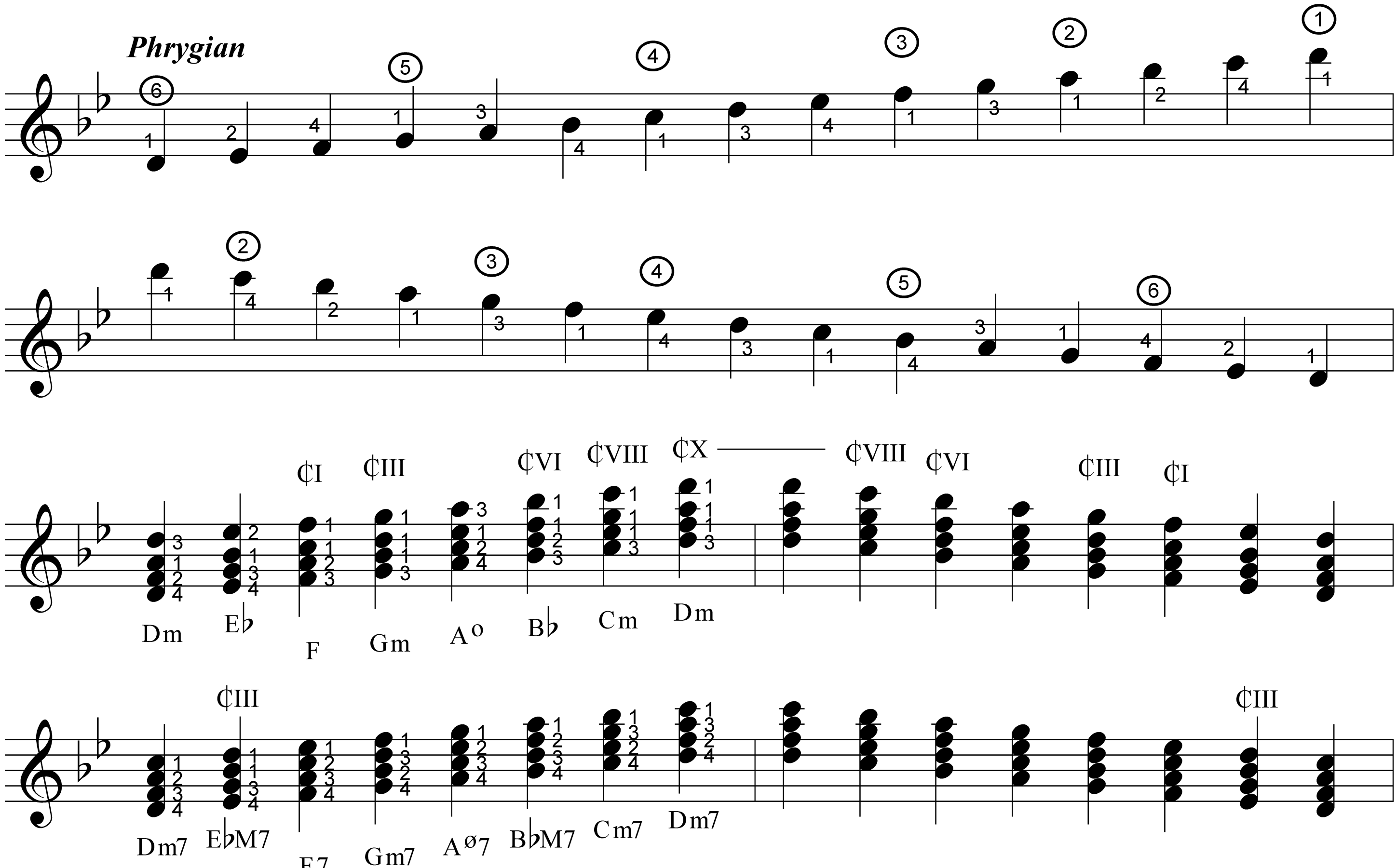


¢I ¢III ¢IV ¢VI ¢VIII
D° E♭ Fm Gm A♭ B♭ Cm D°
¢VIII ¢VI ¢IV ¢III ¢I
¢I ¢III
Dø7 E♭M7 Fm7 Gm7 A♭M7 B♭7 Cm7 Dø7
¢III ¢I

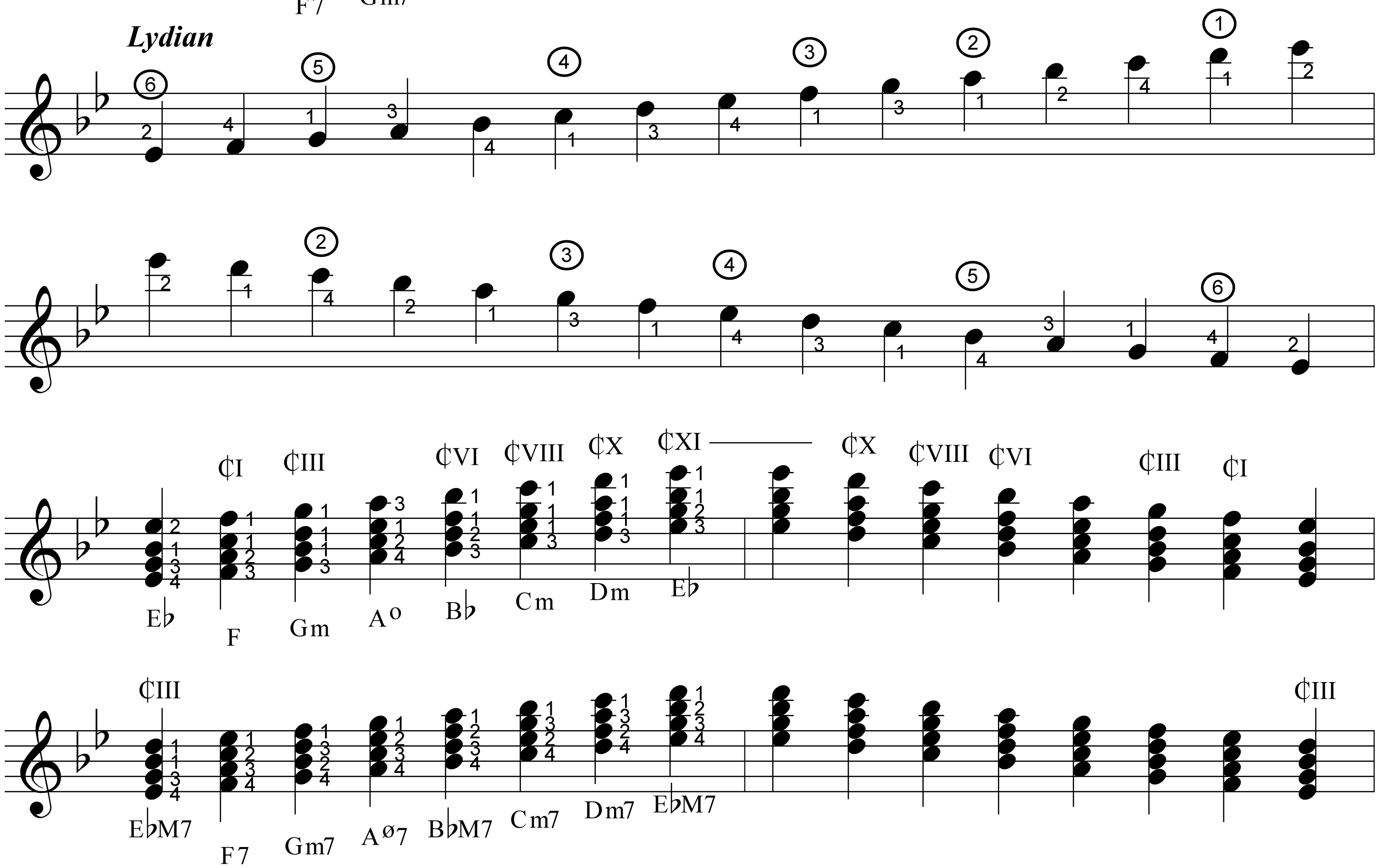
Modal and Minor Scales (two flats)



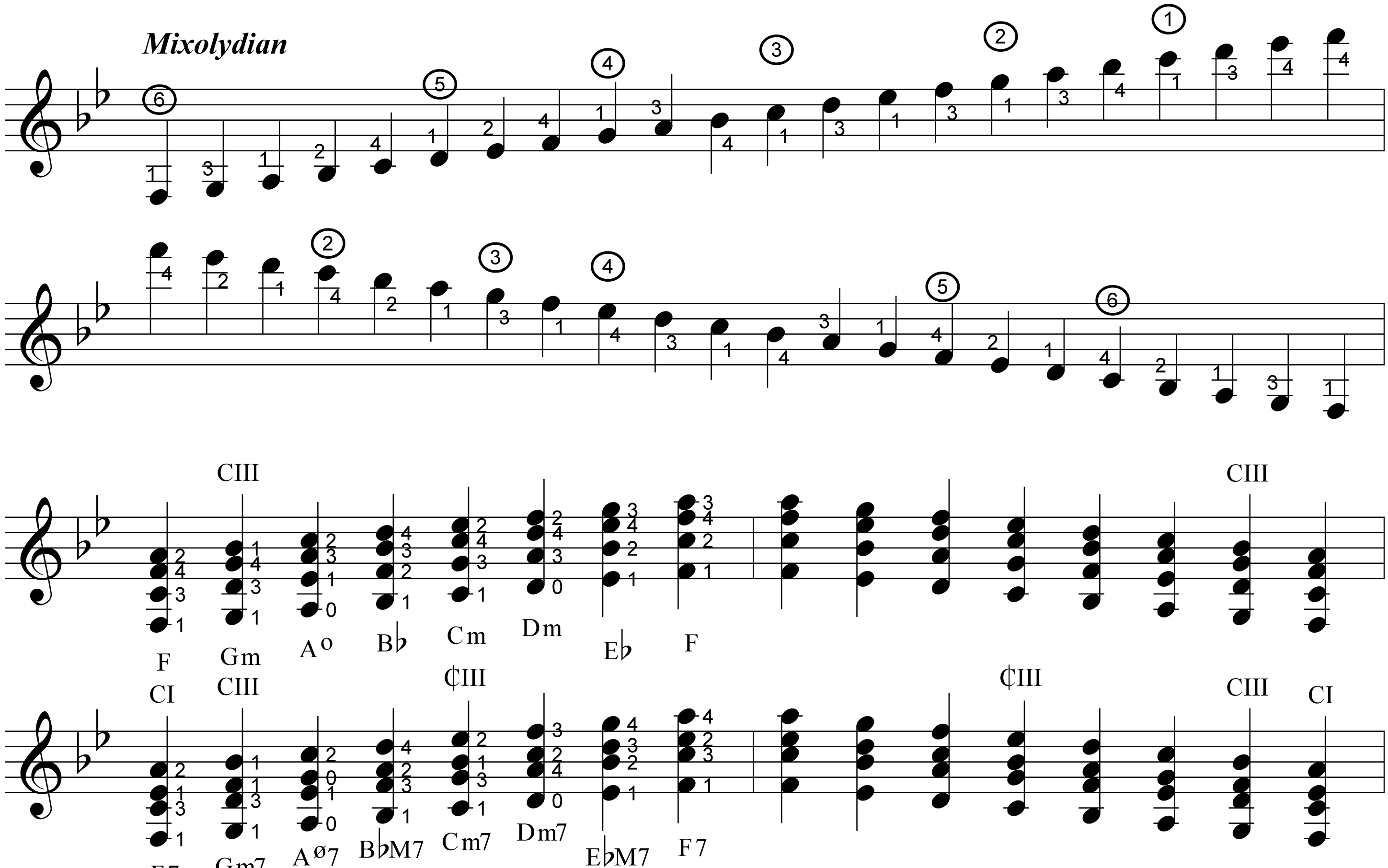
Phrygian



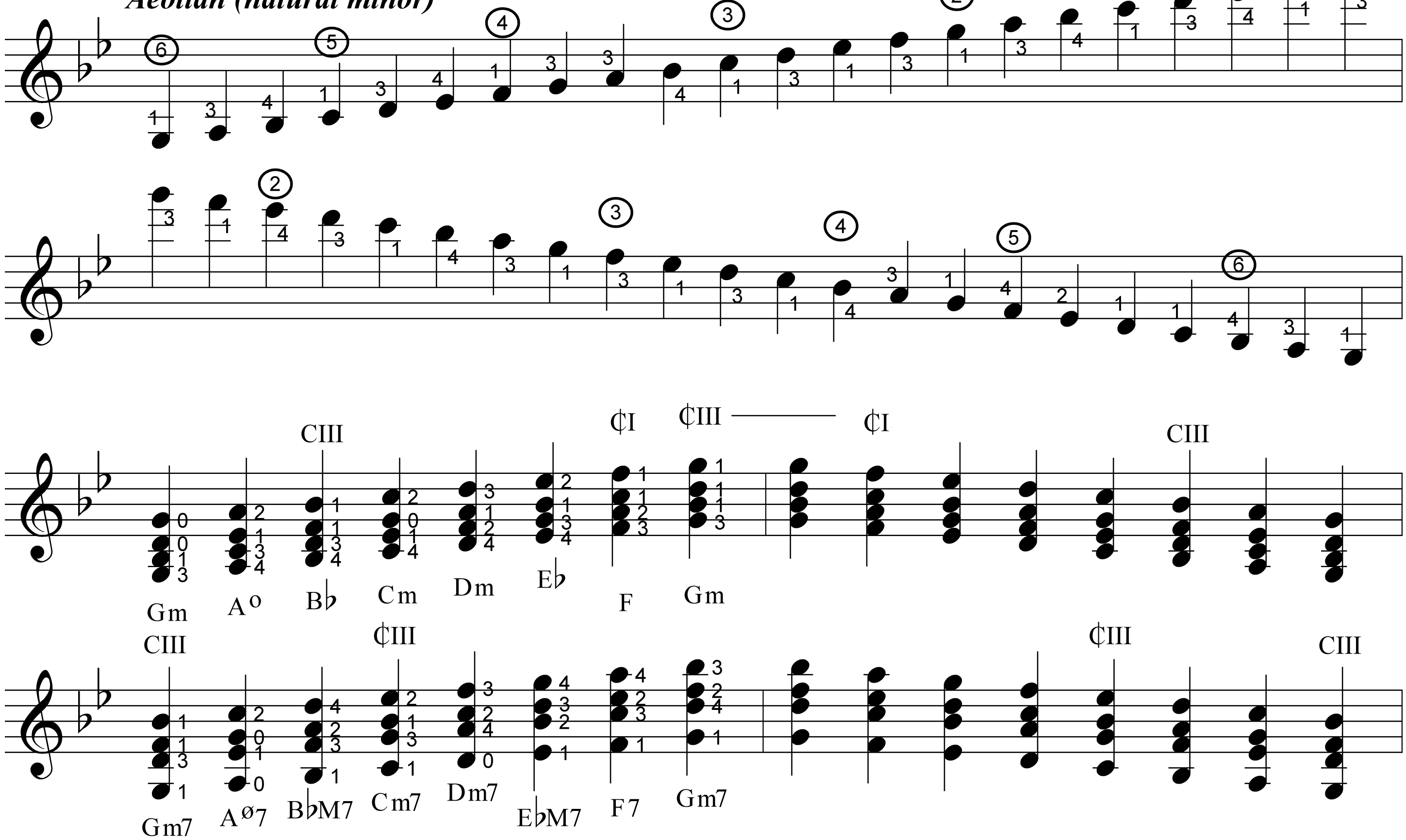
Lydian

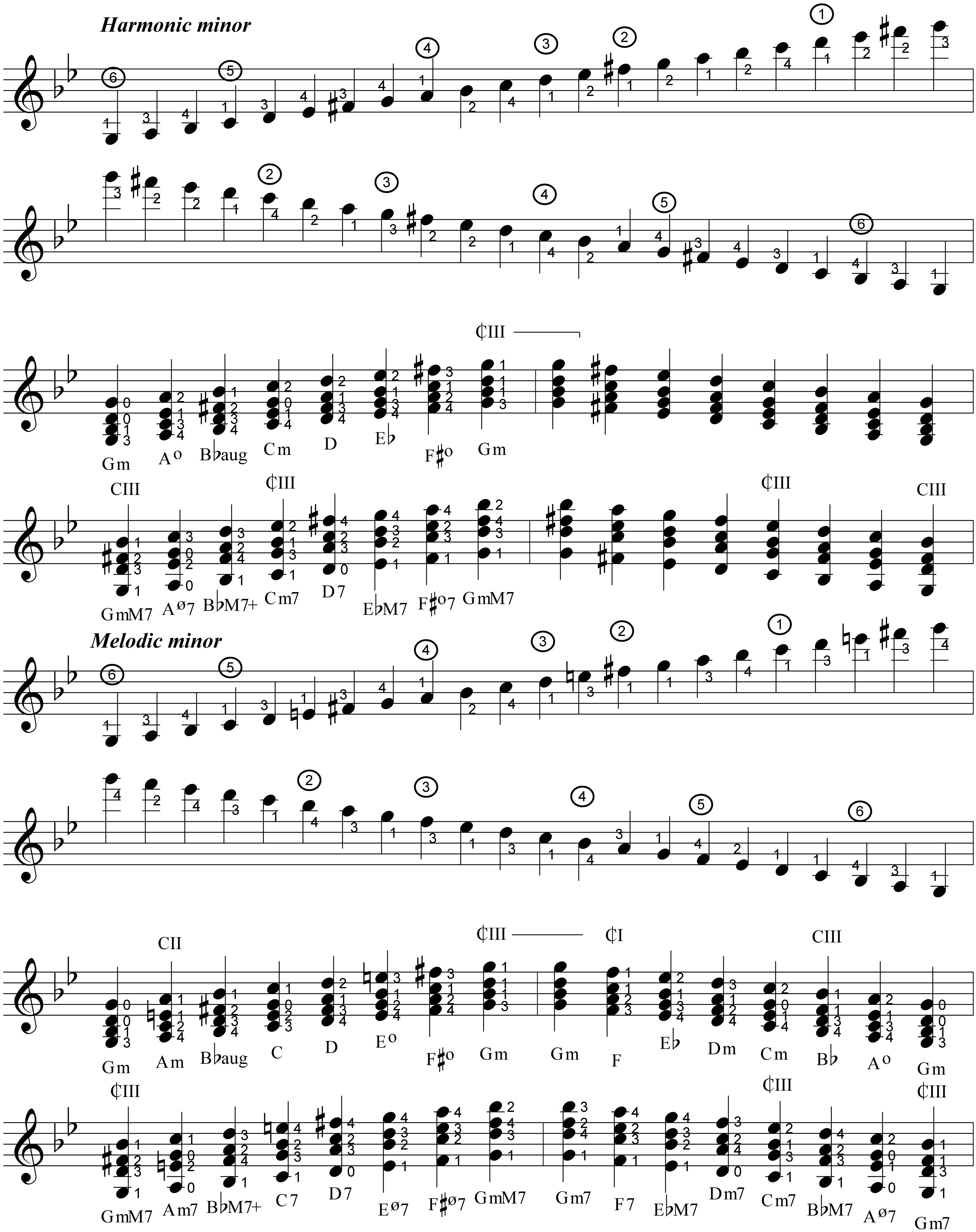


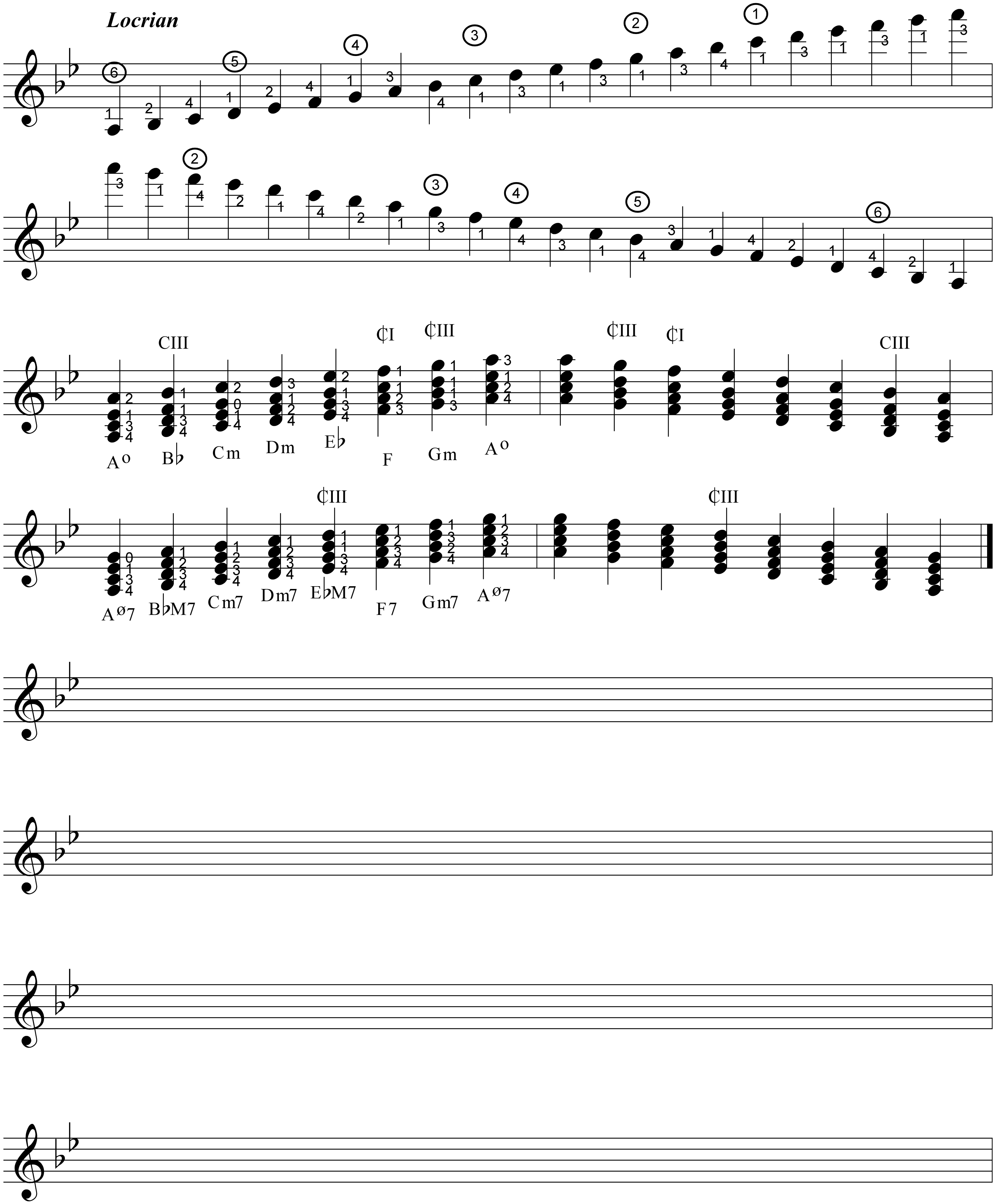
Mixolydian



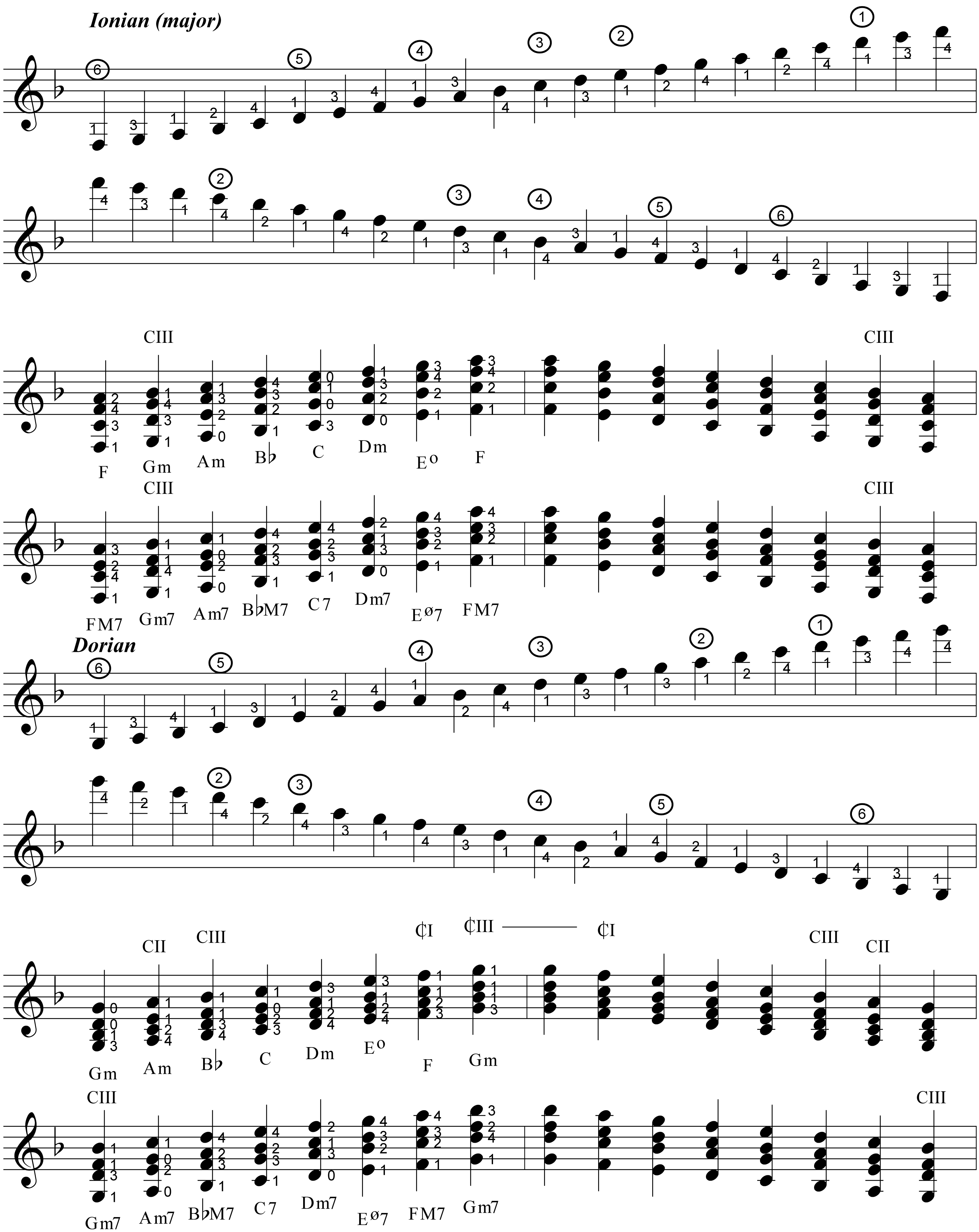
Aeolian (natural minor)

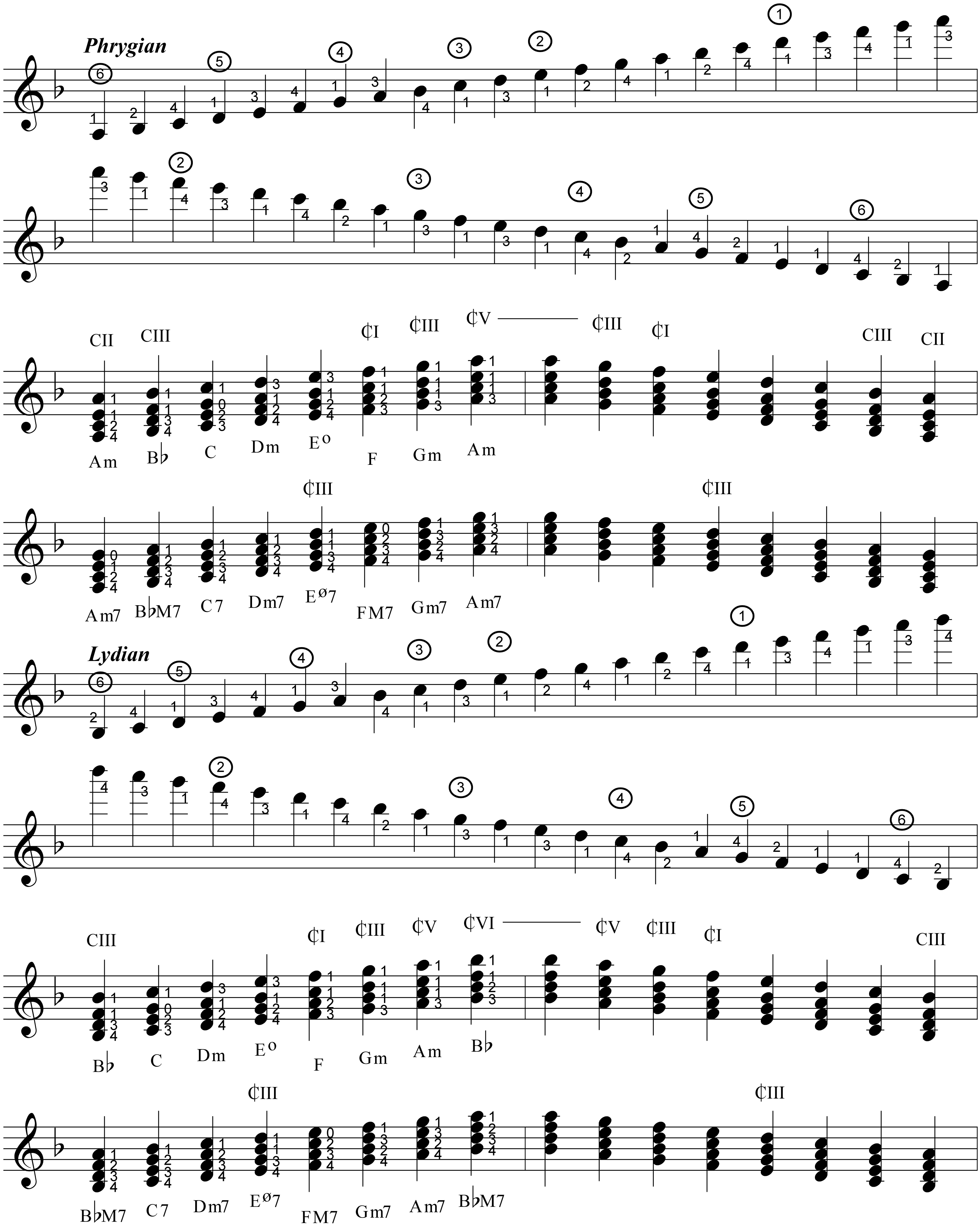


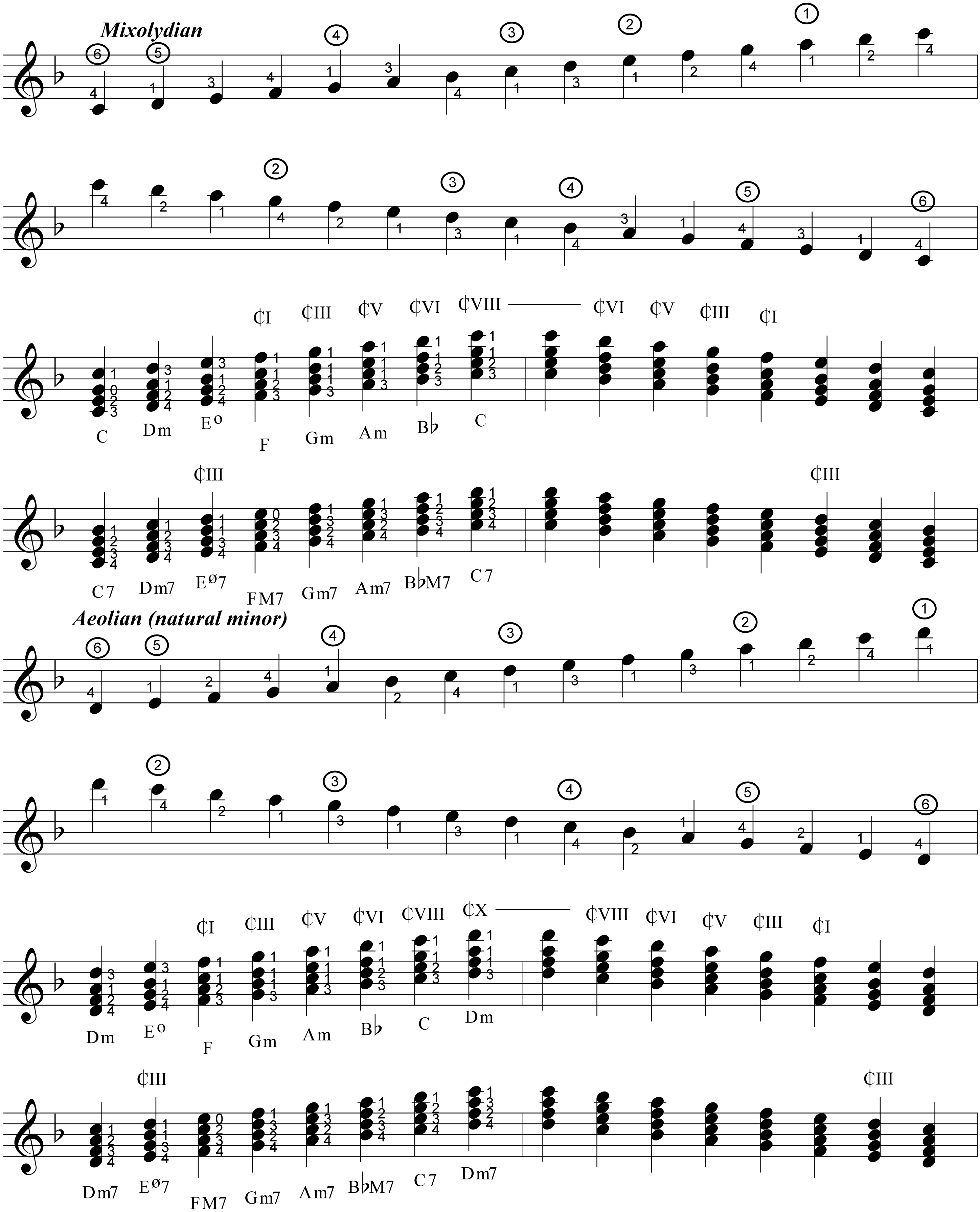

Harmonic minor
CIII
Gm A o B♭aug Cm D E♭ F♯o Gm
CIII CIII CIII CIII
GmM7 Aø7 B♭M7+ Cm7 D7 E♭M7 F♯o7 GmM7
Melodic minor
CII CIII CI CIII
Gm Am B♭aug C D Eo F♯o Gm Gm F E♭ Dm Cm B♭ A o Gm
CIII CIII CIII
GmM7 Am7 B♭M7+ C7 D7 Eø7 F♯ø7 GmM7 Gm7 F7 E♭M7 Dm7 Cm7 B♭M7 Aø7 Gm7


Locrian
CIII
₵I
₵III
₵III
₵I
CIII
A° B♭ Cm Dm E♭ F Gm A°
₵III
₵III
Aø7 B♭M7 Cm7 Dm7 E♭M7 F7 Gm7 Aø7

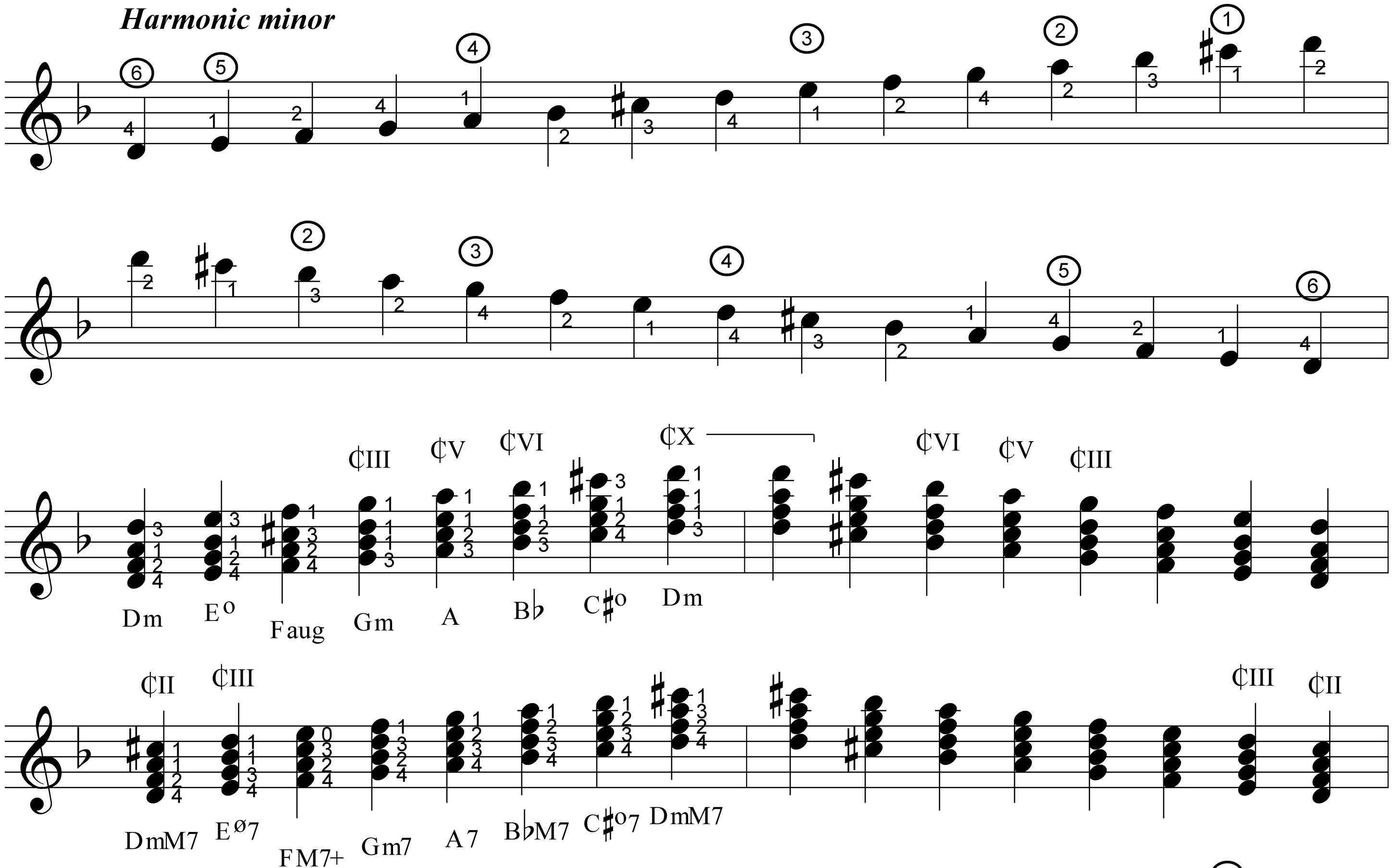
Modal and Minor Scales (one flat)



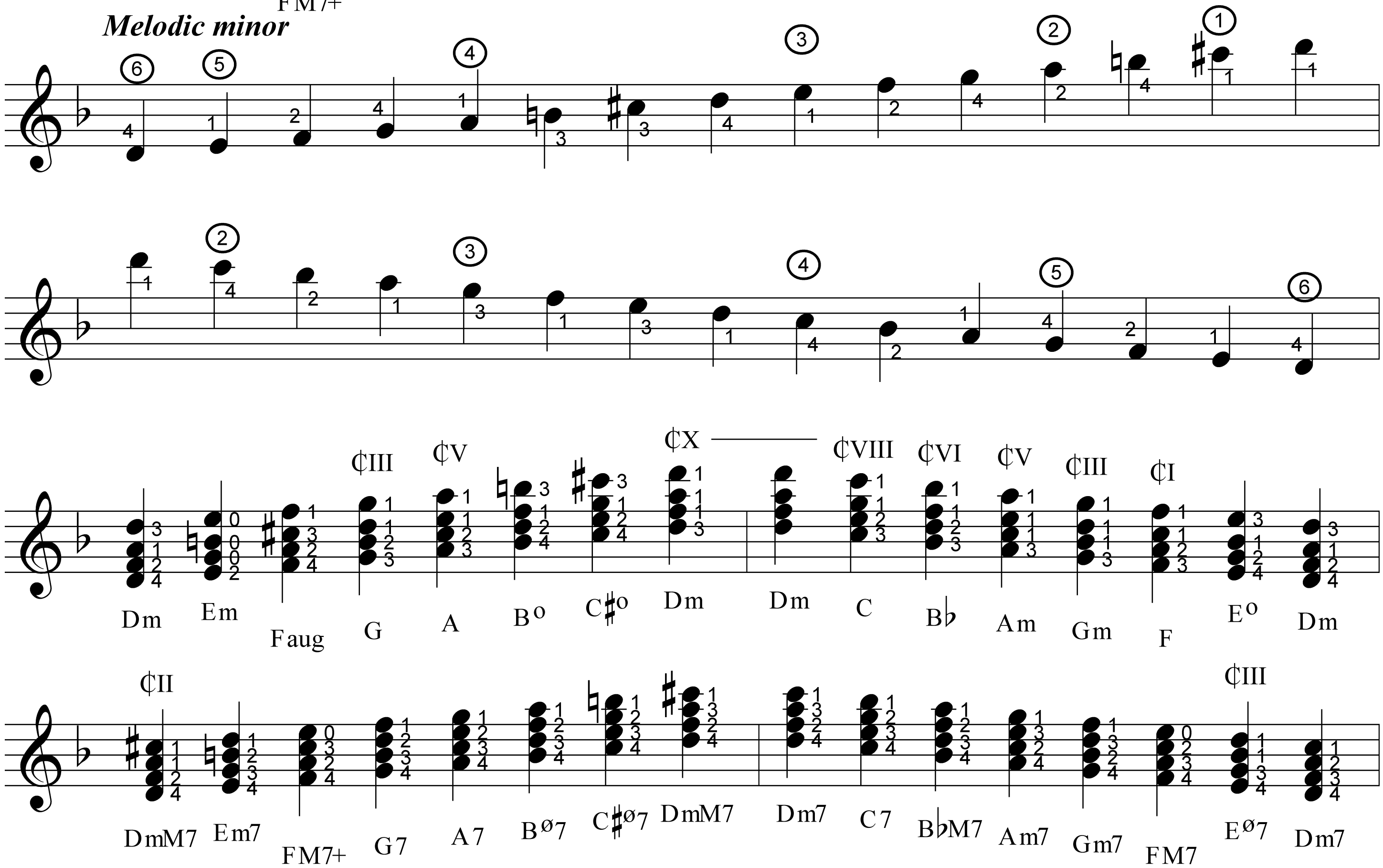

Phrygian
CII CIII ¢I ¢III ¢V ¢III ¢I CIII CII
Am B♭ C Dm Eº F Gm Am
¢III ¢III
Am7 B♭M7 C7 Dm7 Eø7 FM7 Gm7 Am7
Lydian
CIII ¢I ¢III ¢V ¢VI ¢V ¢III ¢I CIII
B♭ C Dm Eº F Gm Am B♭
¢III ¢III
B♭M7 C7 Dm7 Eø7 FM7 Gm7 Am7 B♭M7

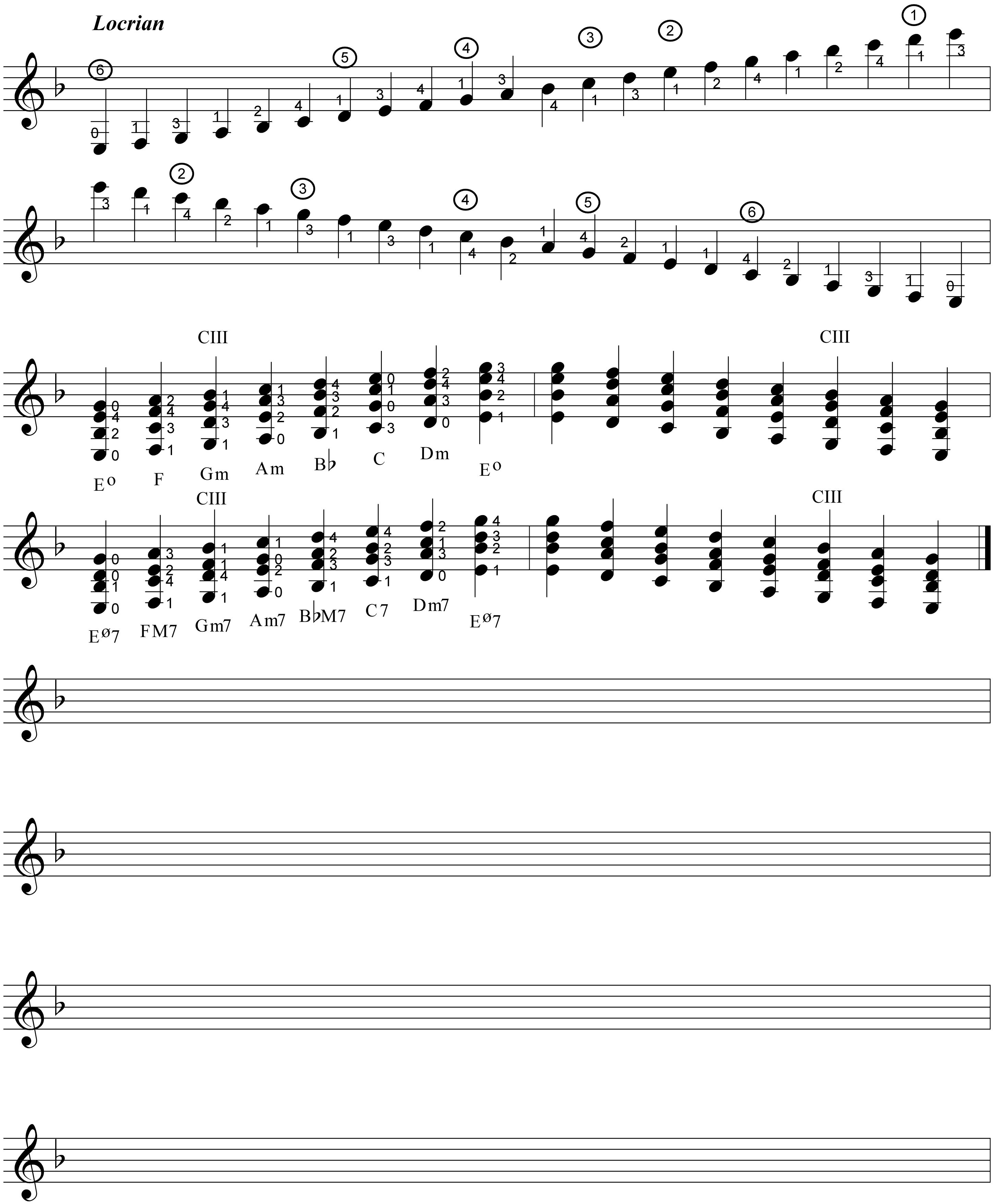

Mixolydian
¢I ¢III ¢V ¢VI ¢VIII ¢VI ¢V ¢III ¢I
C Dm E° F Gm Am B♭ C
¢III ¢III
C7 Dm7 Eø7 FM7 Gm7 Am7 B♭M7 C7
Aeolian (natural minor)
¢I ¢III ¢V ¢VI ¢VIII ¢X ¢VIII ¢VI ¢V ¢III ¢I
Dm E° F Gm Am B♭ C Dm
¢III ¢III
Dm7 Eø7 FM7 Gm7 Am7 B♭M7 C7 Dm7

Harmonic minor



Melodic minor




Locrian
CIII
E°
F
Gm
Am
B♭
C
Dm
E°
CIII
CIII
Eø7
FM7
Gm7
Am7
B♭M7
C7
Dm7
Eø7
CIII