RAM Analytical Skills Introductory Theory Primer

Part 1: Intervals
Part 2: Scales and Keys
Part 3: Forming Chords Within Keys
Part 4: Voice-leading

This is intended to support you in checking you have the theory knowledge we expect at the beginning of the RAM's Analytical Skills modules. There are both explanations of the key concepts and exercises you can do. Important terms are introduced in **bold** when first stated. An answer book is provided as a separate PDF.

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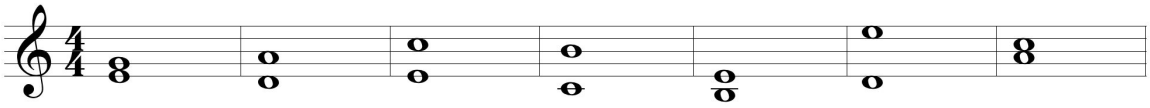
1. Intervals

The distance between any two notes is an interval. There are two components to this – the size of the interval and its quality.

Size is determined by the written distance between two notes, so a C to an E is always is a third (you include the bottom and top notes when counting: C-D-E), regardless of what accidentals are present modifying it. Count from the bottom up!

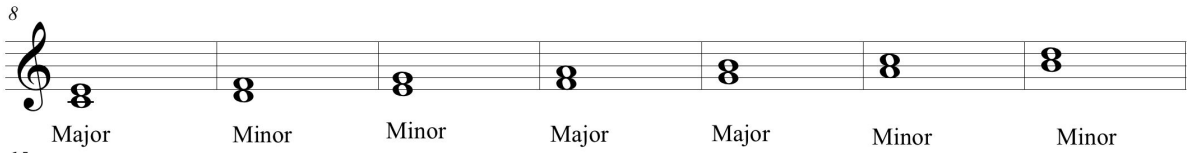
Exercise 1 – determine the size of the intervals:



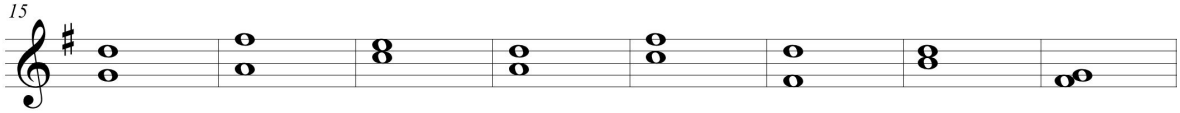
Quality is a way of describing the exact nature of the interval, in relation to how it is written and the diatonic scale.

The '**perfect**' intervals – unisons, octaves, fifths and fourths – have only one quality – perfect – before they become augmented or diminished. An augmented 4^{th} is found between the 4^{th} and 7^{th} degrees of the major scale (and therefore a diminished fifth between the 7^{th} and 4^{th}), otherwise all the 4ths and 5ths found in tonal scales are perfect.

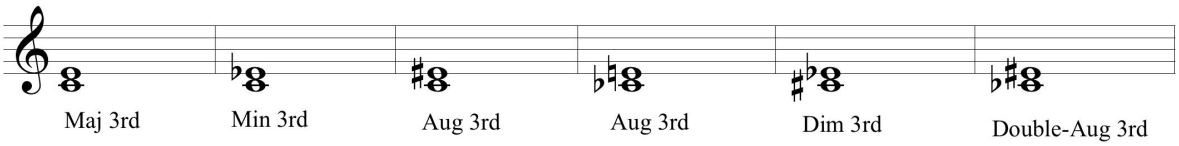
The '**imperfect**' intervals – seconds, thirds, sixths and sevenths – have two forms before they become augmented or diminished: **major** and **minor**. The major intervals are a semitone wider than the minor. Here's an example of how major and minor thirds are formed against each degree of the major scale:



Exercise 2 – determine the size and quality of the following **diatonic** intervals in G major (there are no accidentals making things more complicated yet)!:

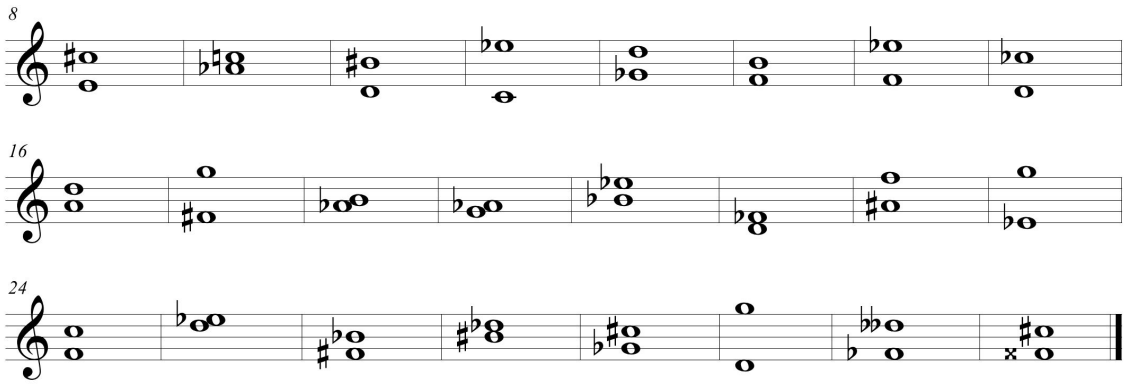


Non-diatonic intervals – those which aren't formed from the notes of a single key - can be augmented or diminished as well (and also doubly-aug/dim etc.). The size, though, is still ALWAYS determined by the written distance between the two notes; these are all thirds:



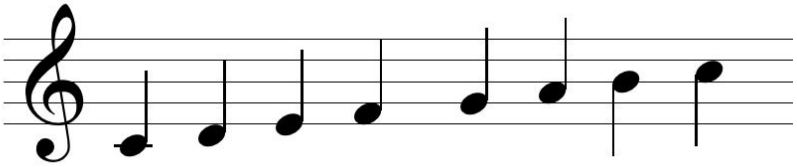
You can work these out by thinking about how they are larger or smaller than the basic form of the interval – the sharp on the top note makes the interval wider, as does the flat on the bottom note, and so on. Intervals larger than an octave can be described either as a 'compound' version of their smaller form or as the actual distance (so either as a compound second or a ninth, for instance).

Exercise 3 - Here are a large number of intervals, outside of any tonal context, to identify. This can be combined with your aural training – sing or play them!



2. Scales and Keys

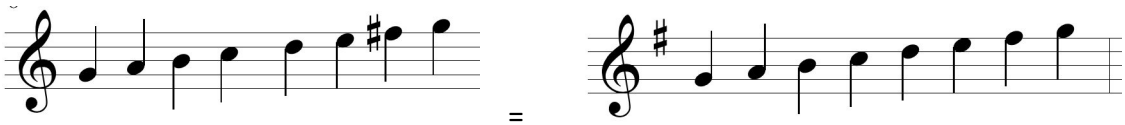
A scale is simply any repeating set of intervals moving in a single direction (ascending or descending). The **tonal scales**, which give rise to **keys**, are patterns of seconds which repeat themselves every octave – starting and ending on the **tonic**. Here the most obvious example:



T T ST T T T ST

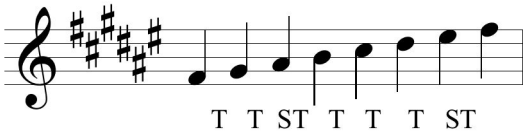
The major scale goes: tone-tone-semitone-tone-tone-tone-semitone. This is true of ANY major key, and what key signatures do is allow this pattern to be repeated on starting from different tonics. As one moves up the circle of 5ths, the addition of sharps introduces a new leading-tone: the last sharp of a key signature is always the leading-tone.

L.Tone



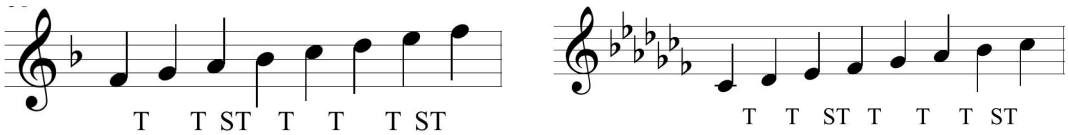
T T ST T T T ST = G major with key-signature

And F# major is just the same, E# is the leading tone:



T T ST T T T ST

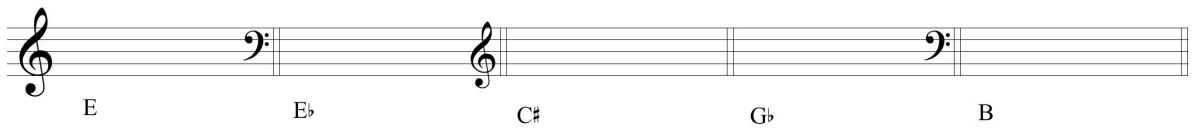
Moving down the circle of fifths, the same thing just happens in reverse – the addition of flats 'takes away' leading tones – the Bb in F major removes the semitone from B-C, so E-F becomes the leading semitone, and so on, here in F major and C-flat major:



T T ST T T T ST T T ST T T T ST

Exercise 4a:

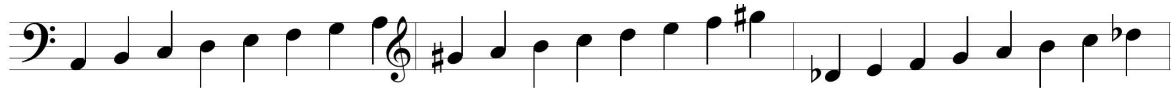
Write key signatures for the following major keys



E E♭ C♯ G♭ B

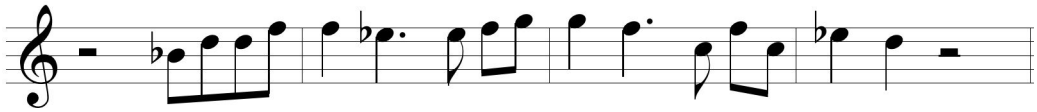
4b:

Add accidentals to make the following into major scales

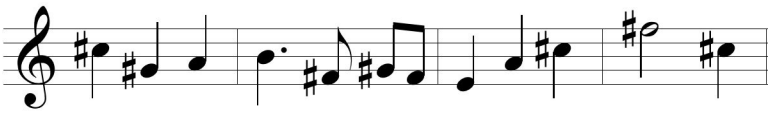


4c:

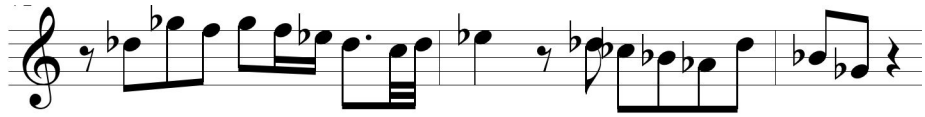
Identify the keys of the following extracts (written with accidentals rather than key signatures). It could also be helpful to sight-sing these: again aural and theory work together, and when you sing them it should be obvious what the scale degrees (and therefore the keys) are.



(Mozart)



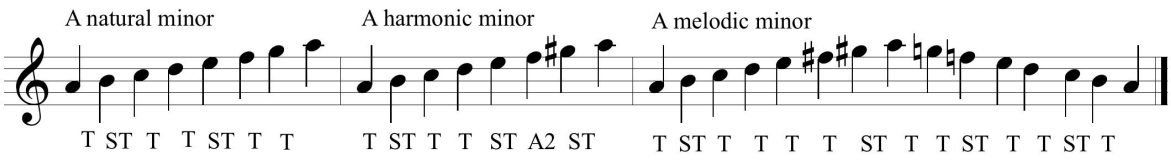
(Brahms)



(Bach, transposed)

Minor keys

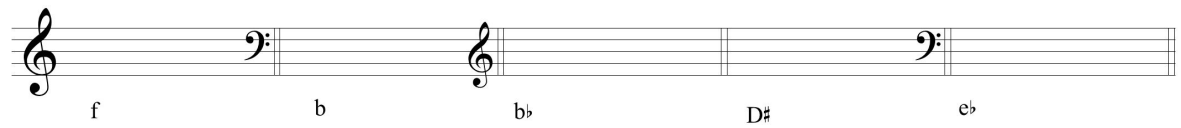
These are of course a slightly different pattern of tones and semitones, with a minor 3rd between the 1st and 3rd degrees. The complication here is that the **natural** minor resulting from the key signature isn't really used in actual music as it lacks a leading tone. Sharpening the 7th degree of the scale makes the **harmonic** minor scale. However, this has an augmented 2nd between the 6th and 7th degrees, which can be awkward melodically, so the **melodic** minor scale raises both the 6th and 7th scale degrees in its ascending form, where the leading tone needs to rise, before returning to the natural minor when descending.



Minor keys always share a key signature with a major key a third higher (a **relative** relationship), and have three fewer sharps (or 3 more flats) than the major key with the same tonic (a **parallel** relationship).

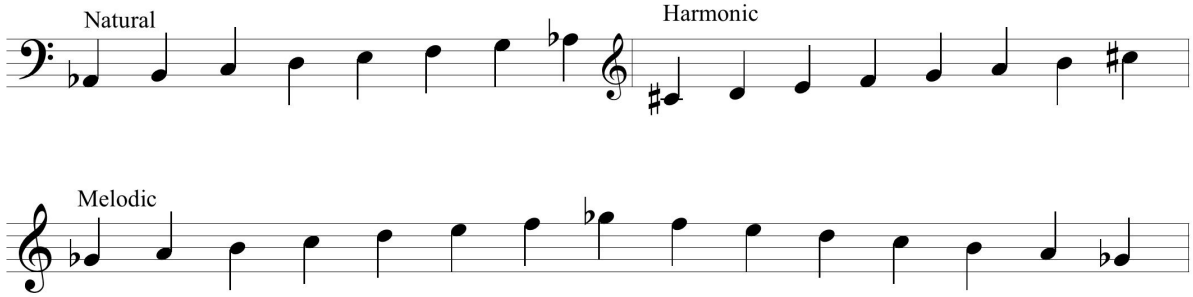
Exercise 5a:

Write key signatures for the following minor keys:



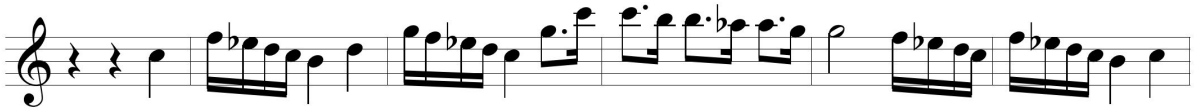
5b:

Add accidentals to make the following into the indicated form of minor scale:

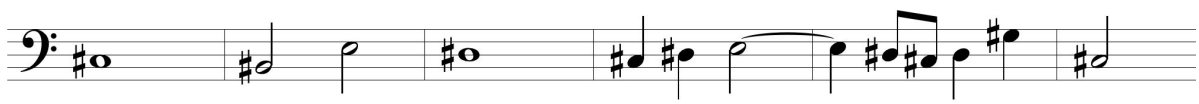


5c:

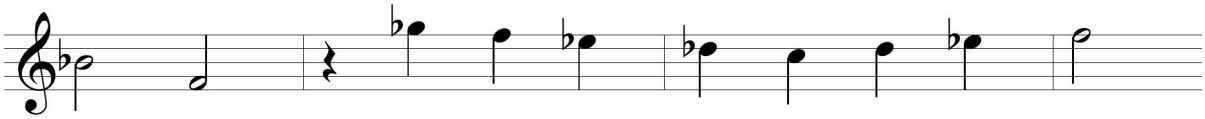
Identify the keys of the following extracts (written with accidentals rather than key signatures) – once more, good sight-singing exercises, too.



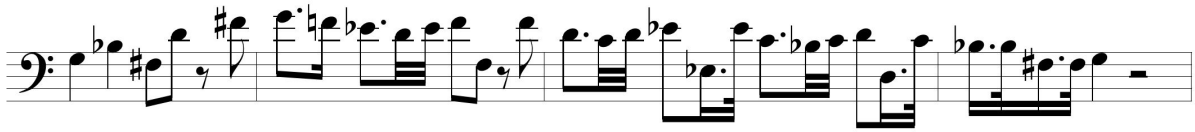
(Haydn)



(Bach)



(Bach)



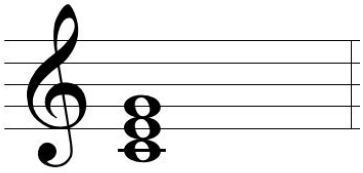
(Haydn)

3. Forming chords within keys

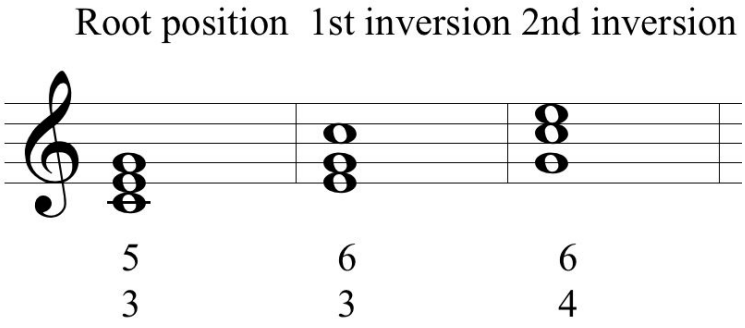
To understand the underlying system of **functional harmony** which is at the heart of all **common-practice tonality** (the language of all the music we study in the Analytical Skills modules), the next step is to look at the chords which are its vocabulary. There are two crucial things to understand here. The first is that they are to be understood in relation to the scales we've just been looking at: a chord built on C has a different **function** if C is the root of the scale (it is a **tonic** chord) than if it is the fifth of the scale (it is a **dominant** chord). Secondly, the chords are all **tertian** – that is, built by stacking thirds on top of each other. Chords with 3 notes are **triads** and chords with 4 notes **7th chords.** The only chords in common-practice tonality with added 6ths are augmented 6th chords, which we will study later. To start with, we'll look at triads.

3a. Triads

This, hopefully unsurprisingly, is a C major triad.

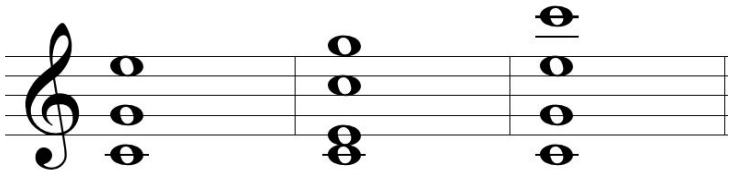


It has a major third in between the lowest note and the middle one, and a minor third between the middle note and the top, meaning that there is a perfect fifth between the outer notes. This means the triad is a major one in **root position**, also called a 5/3 in the system of **figured-bass** we use. This is because it consists of a third and a fifth above the bass. We can take the same 3 notes and rotate them, creating **inversions**:

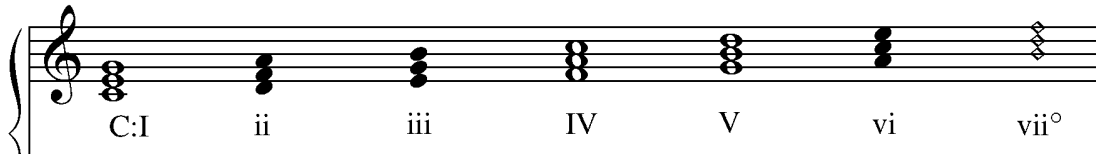


Again, the numbers describe the relationship between the bass note and notes above it – a third and a sixth for 1st inversion and a fourth and a sixth for 2nd. The correct use of inversions is important for voice-leading and harmonic progression, but the second-inversion chord has a special status: the fourth between the bass and the root makes it unstable, and it can't be used interchangeably with other forms of the chord (you'll learn much more about this later). In figured bass, to keep the amount of information to a minimum, 5/3 isn't written at all, and 6/3 is abbreviated to 6.

It is important to note that changing the order or number of notes *above* the bass doesn't change the inversion of the chord, just what is called its spacing or voicing. In other words, all these chords are in root position:

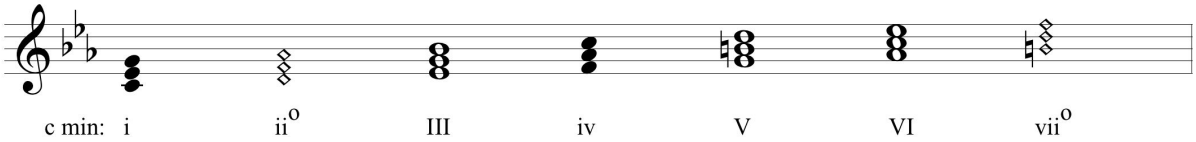


Next, we can write root-position triads on each degree of the scale (in this case just C-major), which are labelled with **roman-numerals**:

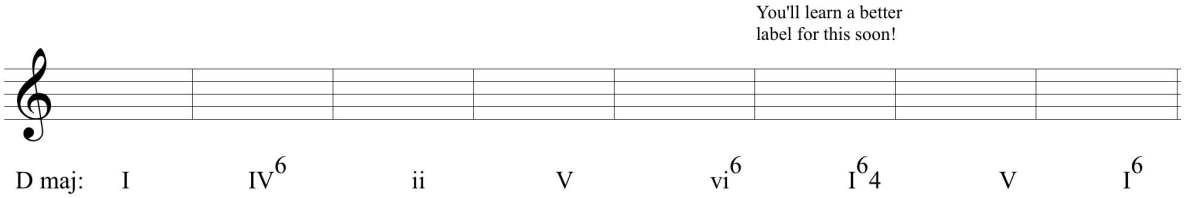


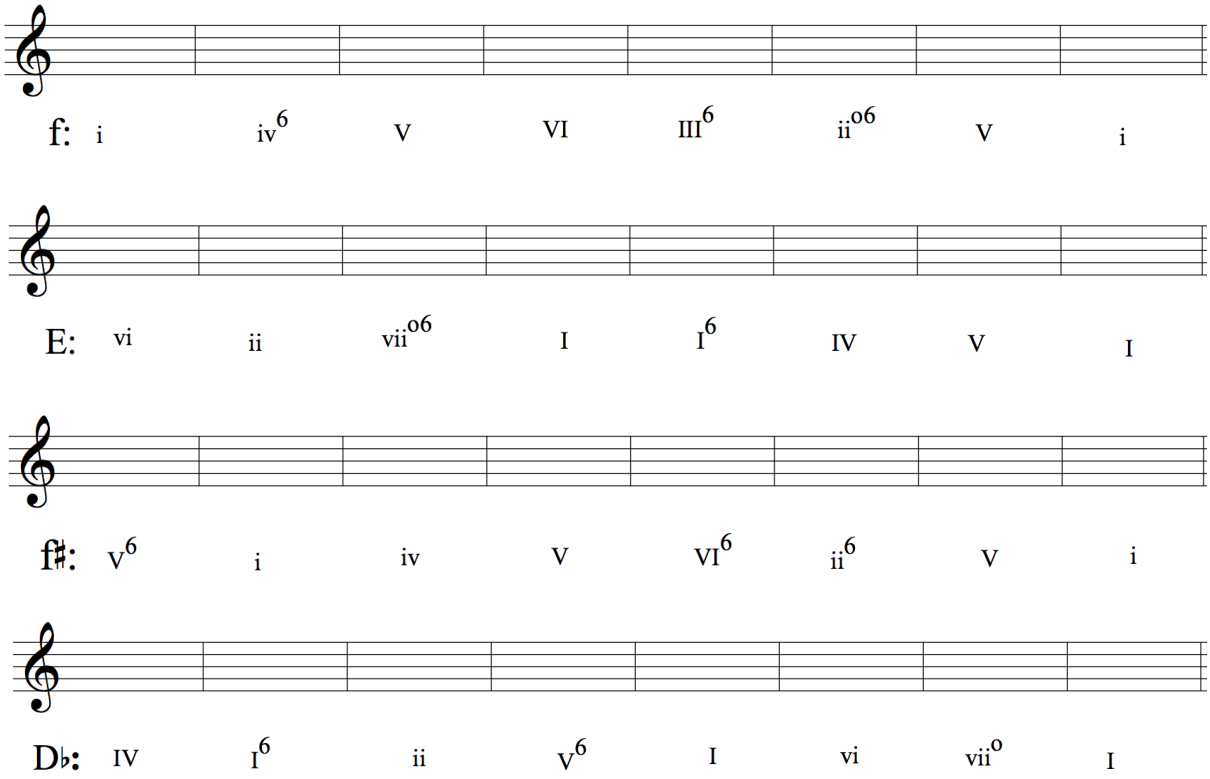
The triads on the root, fourth (**sub-dominant**) and fifth (dominant) scale degrees are all major, as already discussed. Those on the second (**super-tonic**), third (**mediant**) and sixth (**sub-mediant**) have a minor third between the root and a major one between the middle note and the fifth (so swapping the order around from the major triad). This makes them **minor triads**, which are indicated with a lower-case roman numeral. Finally, the triad built on the seventh (leading-tone) consists of two minor thirds, which means the fifth between the outer notes is diminished rather than perfect: this gives rise to a **diminished triad**, indicated by the little circle next to the numeral.

Exactly the same thing can be done in the minor giving rise to a different pattern of major, minor and diminished chords – using the harmonic minor scale to make a major dominant chord, but not in chord III:



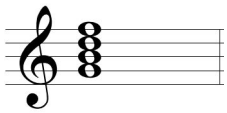
Exercise 6: Write triads in the given keys – upper case letters are major, lower minor - as indicated by the roman numerals and figures, using accidentals (note that these are all progressions of chords that make sense harmonically):



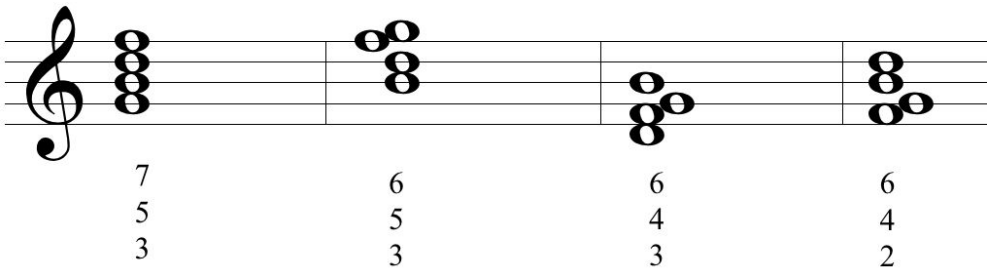


3b. 7th chords

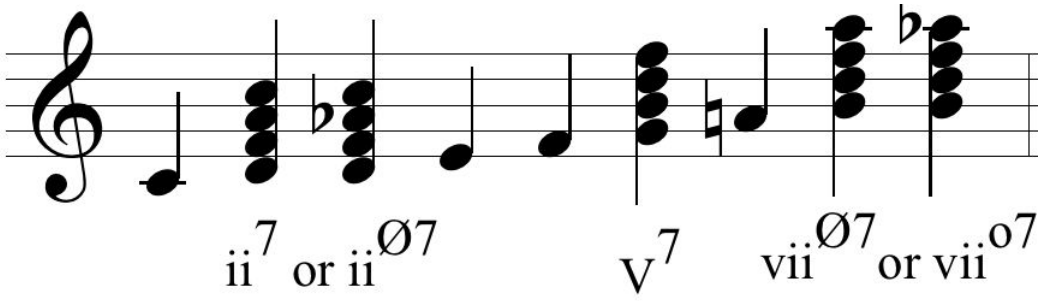
If we add another third onto a triad the interval between the root and this note is a 7th, unlike the 3rd and the 5th a **dissonance**, which means it needs to be **resolved** (again, these are concepts which will be explored in more depth later and in the module itself). Here's a 7th chord built on the dominant of C: the **dominant 7th**.



This is a major triad, but with a minor 7th between the root and the 7th – this type of triad always acts as a dominant. Again it can be rotated into inversions (3 now), and those represented by figures:



Returning to the scale, an important thing to note is that in the approach taken in this module (other people do have different views on this, so if you have done theory before you might have encountered these), 7th chords are only built on the 2nd, 5th and 7th degrees of the scale.



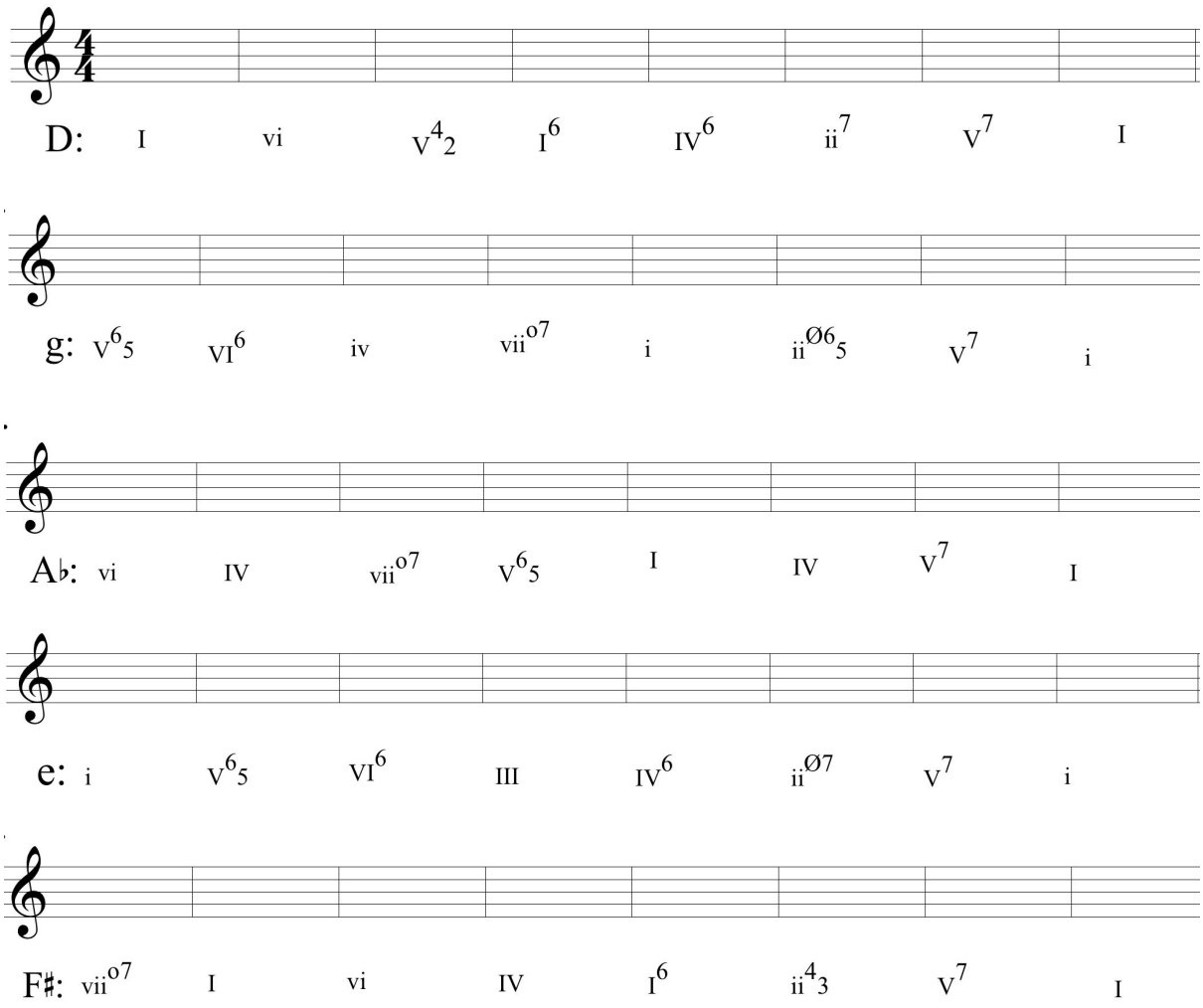
This shows that 7th chords often use a lowered 6th degree of the scale – the A flat seen here is found in both the major and the minor. The chord on the 2nd degree has a minor 7th, and the triad is either minor or diminished – the latter is a **half-diminished** 7th chord, indicated by the ∅ symbol. The 7th on the 2nd degree always wants to go TO the dominant, so is called a **pre-dominant**. The chord built on the leading tone is a diminished triad, either with a minor 7th (and thus half-diminished), or, if the 6th degree of the key is lowered, **fully-diminished**. As this chord is built on the leading-tone, which needs to resolve upwards to the tonic, it acts like the dominant.

When thinking about inversions, diminished chords can seem confusing as the intervals are all minor thirds or augmented, but they are only in root position when they stack up in *written* thirds as shown above. The following table summarizes the figures that are used to indicate inversion:

INVERSION	TRIAD	7th Chord
Root	(5) (3)	7 (5) (3)
1st	6 (3)	6 5 (3)
2nd	6 4	(6) 4 3
3rd	Doesn't exist!	(6) 4 2

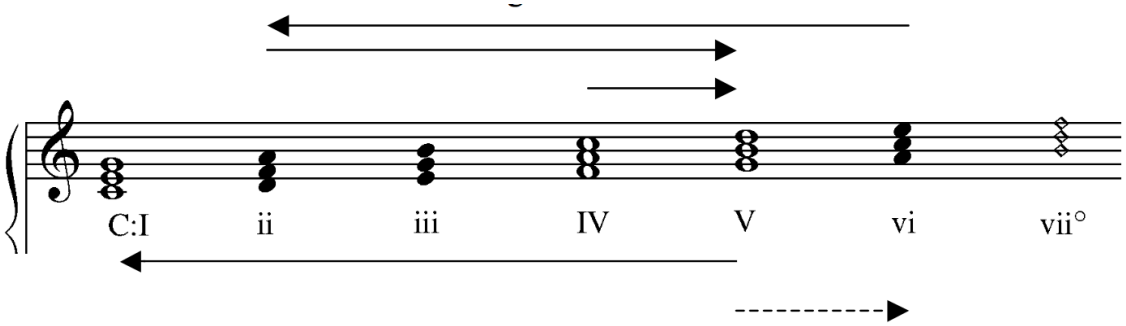
(the numbers in brackets here are intervals that are in the chord - always calculated in relation to the bass – that aren't included in the figures, which are a short hand to give the necessary information with as little 'extra' as possible).

Exercise 7: Complete the following progressions, again using accidentals rather than a key signature. Being able to sing the chords is, once again, a really useful exercise.



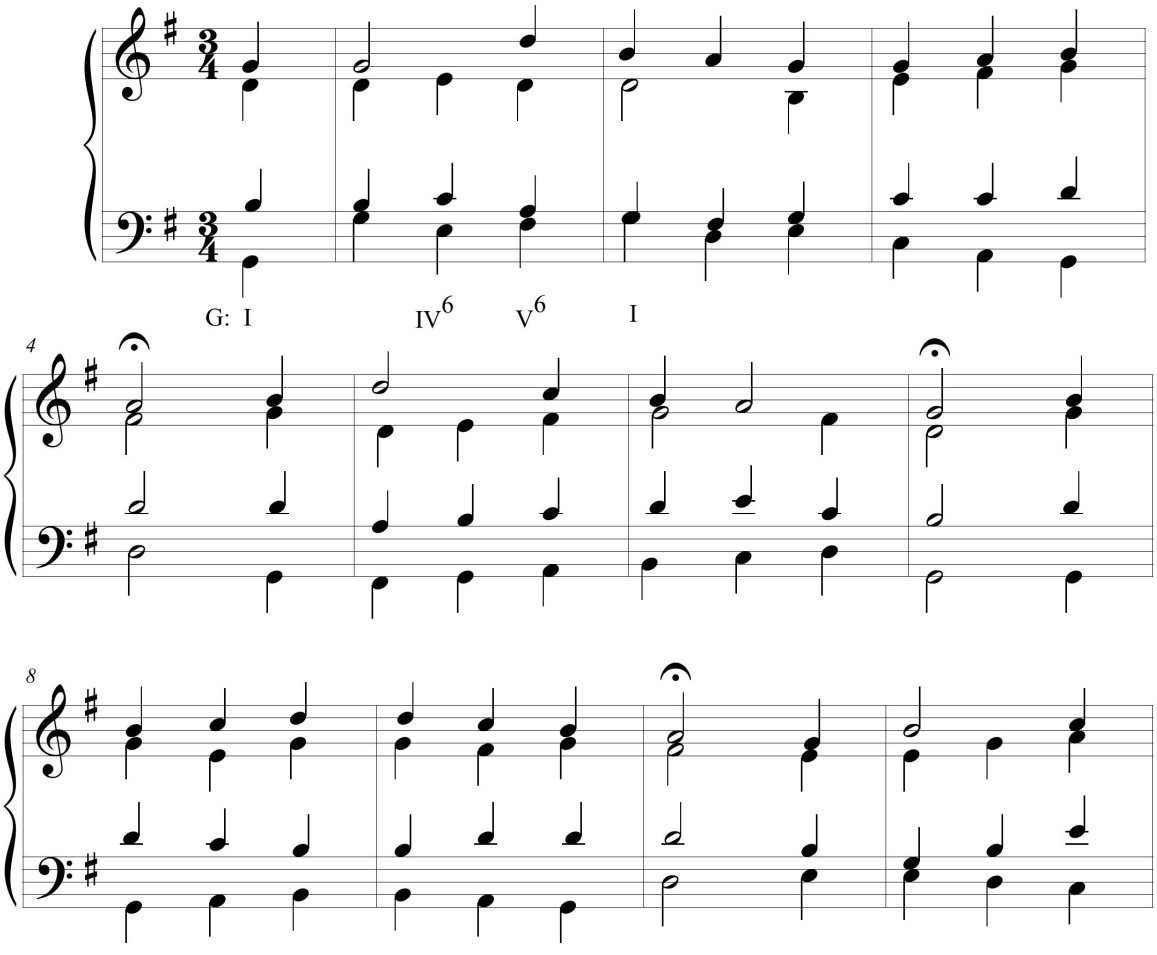
3c. Harmonic Progression

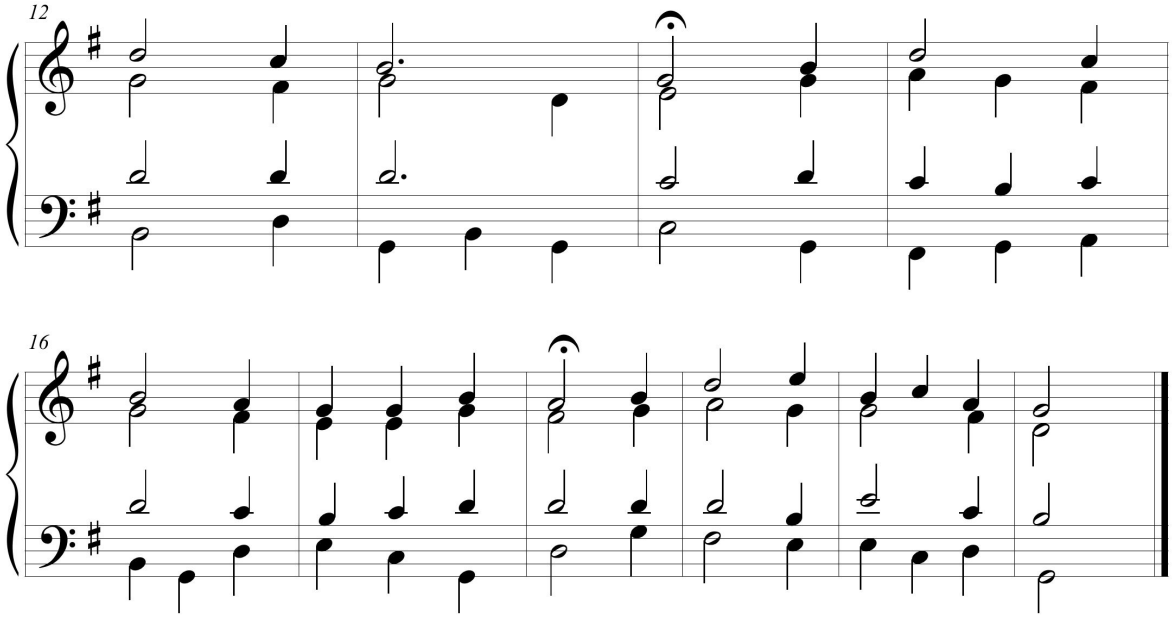
While all the exercises above are coherent **progressions**, they were really concerned with helping you form chords, not connect them up. A crucial aspect of this is **voice-leading**, which will be explored in the final part of this primer. However, this can also be understood in terms of the functional tendencies of chords to need to go to specific other chords. The most obvious of these is for chord V to want to go to chord I: it can also go to chord vi, which sounds like a surprise (an **interrupted** cadence for instance), whereas, at least in the context of classical tonal music if it goes to chord IV this usually sounds wrong. Here is a way of summarizing these tendencies graphically:



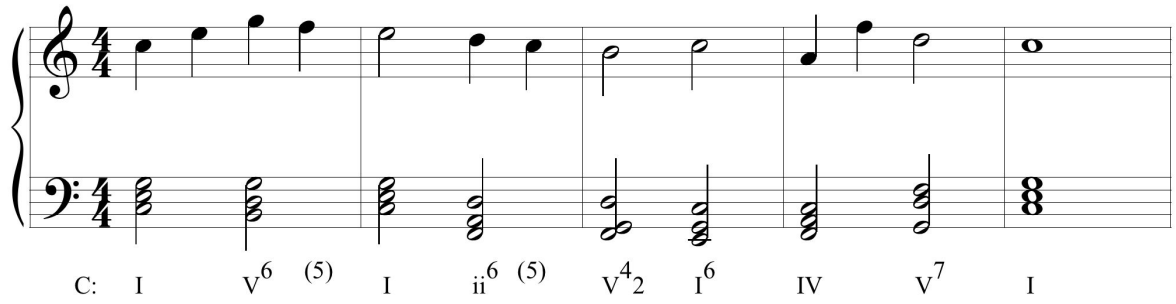
Chord I can go more or less anywhere, ii and IV need to go to V on the whole, but can also go back to the tonic, and V to I (or maybe vi). There is a lot more to explore about how this actually works, but simply put I-V-I is the fundamental movement of tonal harmony (with vii acting like V), and vi, ii and IV fill the space between them. This can be understood both by analysis (as a starting point, using roman numerals) and by harmonization exercises, fitting chords to given melodies.

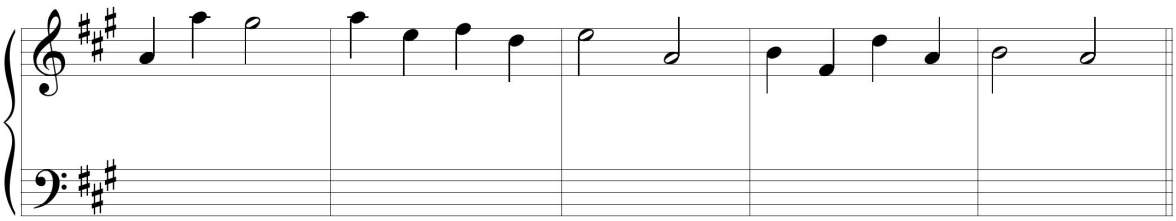
Exercise 8: Label the chords in the following (simplified) Bach chorale with Roman Numerals, and indicate the inversions with figuring. The first few chords are already done as an example.

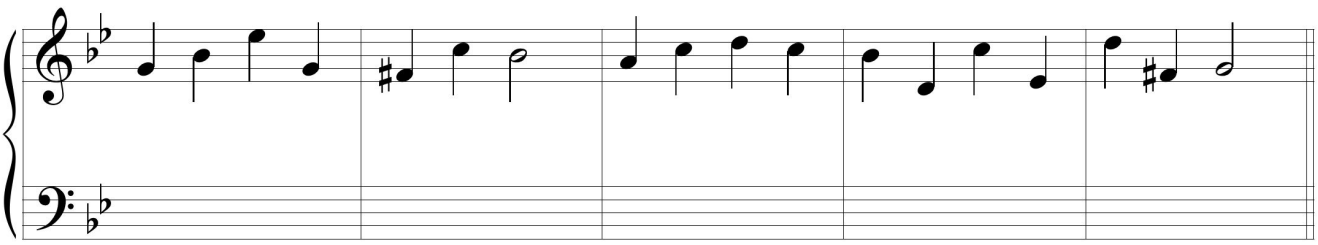




Exercise 9: The following melodies can be harmonized using chords I, ii, IV and V (sometimes needing a 7th) or their minor key equivalents. They ALL change harmony twice per bar, and ALL the melodic notes are part of the chord – again, non-harmonic tones are something that will be dealt with elsewhere in the module. You may use inversions if you wish – although, once more, avoid 2nd inversions unless you already know how to use them. For now just write the chords in close spacing and don't worry about voice-leading. Do include roman numerals, though. The first one is an example, although your voice-leading can be cruder for now!





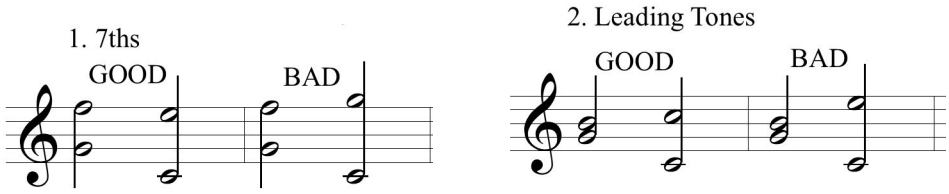


4. Voice-Leading

Voice-leading could reasonably be defined as 'the principles by which simultaneous musical lines are combined'[1]. These include rules for the handling of dissonance, the types of musical motion permitted between different types of interval (in particular the handling of perfect consonances), the spacing of parts and the doubling of notes in chords. This isn't the time to cover all of these, but some basic principles that relate to what has already been covered in this primer are important. It is also essential to understand the different types of musical motion between lines. For simplicity's sake these examples are only in 2 voices.

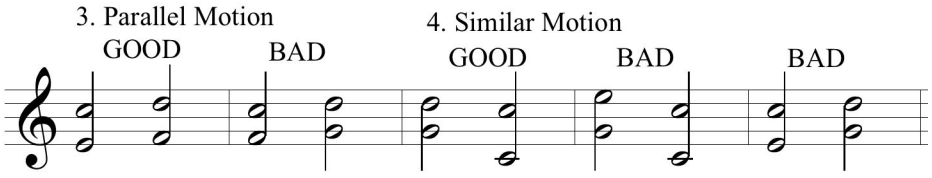
Rules of Resolution

1. Dissonances resolve DOWNWARDS by step (this is especially true of the 7ths in chords, the only type of dissonance used in these exercises). This means there are NEVER two dissonances in a row between the same voices.
2. Leading tones must resolve UPWARDS by step to the tonic.



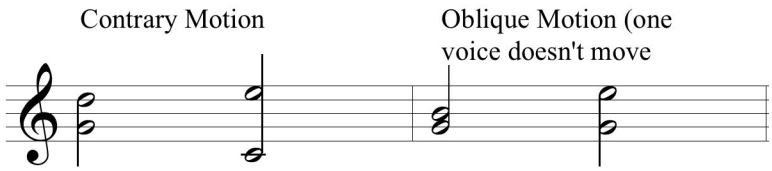
Rules of Motion

3. Avoid **PARALLEL MOTION** between PERFECT consonances (unisons, 5ths, 8ves)
4. **SIMILAR MOTION** towards a PERFECT consonance between the outer voices is only acceptable when the upper part moves down by step.



[1] Paraphrased from Huron, D, *Voice Leading: The Science Behind a Musical Art* (Cambridge, MA: MIT Press), 2016, pg.1.

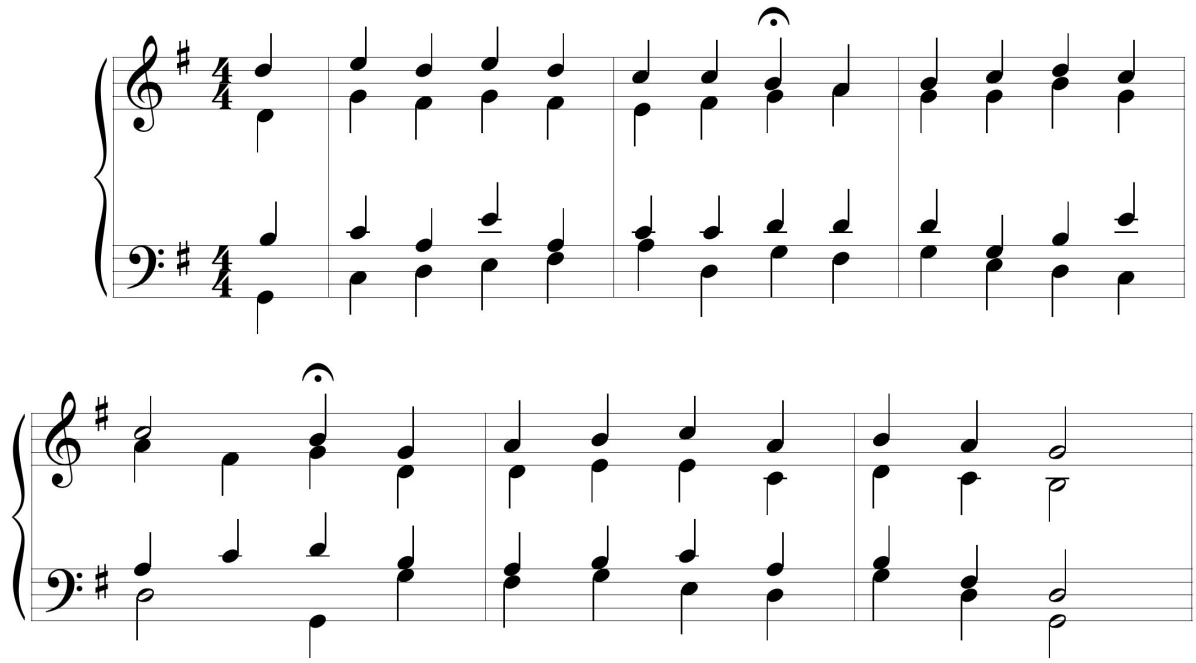
These types of motion are always OK, as long as rules of resolution are followed:



Rule of Doubling

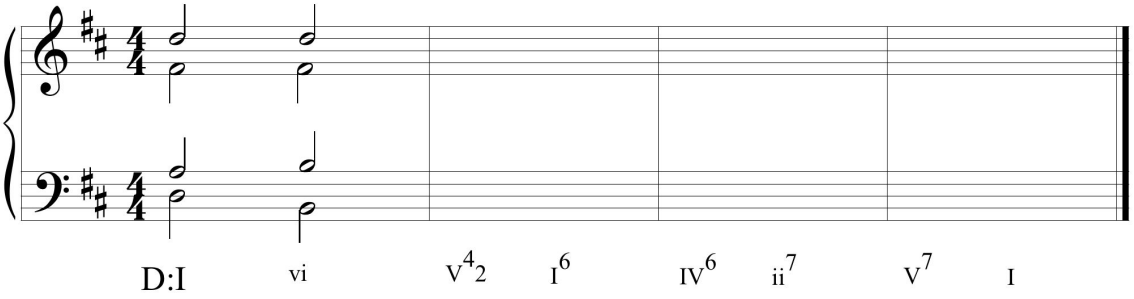
5. Avoid doubling notes which need to resolve (see rules 1&2 – their resolution creates parallel octaves).

Exercise 10: find the deliberate voice-leading errors in the following, horribly messed up, Bach Chorale:

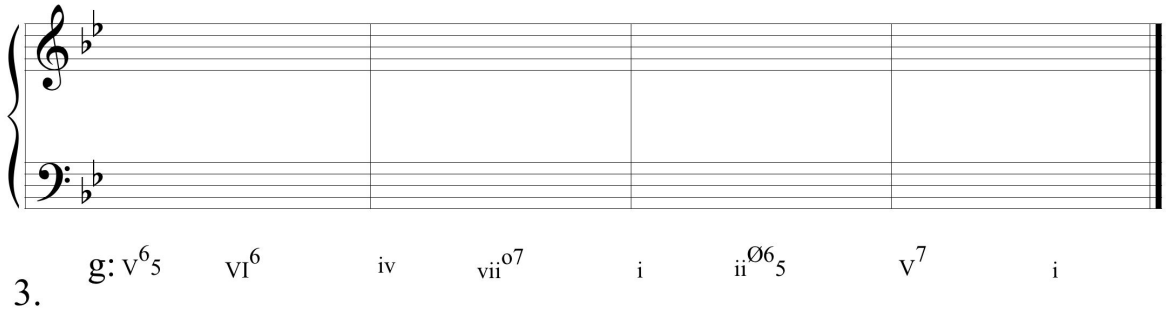


Exercise 11: Take the chords from Exercise 7 and convert them into a 4-part chorale with good voice-leading (unlike the one you've just looked at!). Do the bass, which is fixed by the roman numerals, first, then the soprano, then add the inner parts.

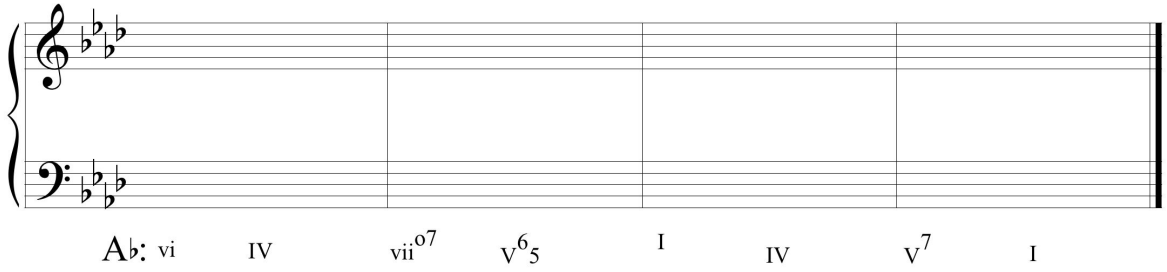
1.



2.



3.



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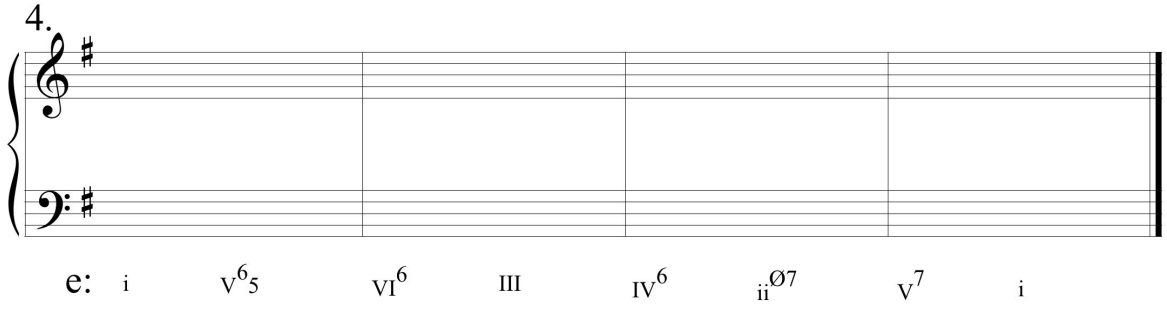

5.