

Music Fundamentals 5: Triads, Chords, Introduction to Roman Numerals

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C O N N E X I O N S

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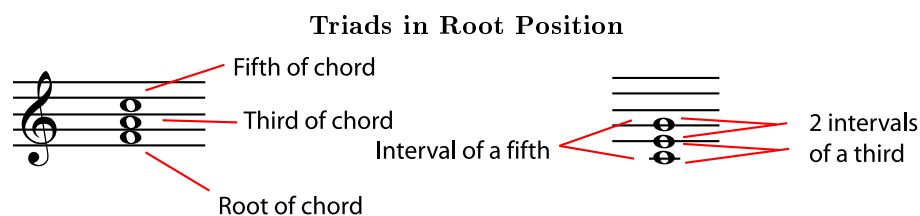
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Chapter 1

Triads¹

Harmony² in Western music³ is based on triads. **Triads** are simple three-note chords⁴ built of thirds⁵.

1.1 Triads in Root Position



The chords in Figure 1.1 (Triads in Root Position) are written in root position, which is the most basic way to write a triad. In **root position**, the **root**, which is the note that names the chord, is the lowest note. The **third of the chord** is written a third⁶ higher than the root, and the **fifth of the chord** is written a fifth⁷ higher than the root (which is also a third higher than the third of the chord). So the simplest way to write a triad is as a stack of thirds, in root position.

NOTE: The type of interval or chord - major, minor, diminished, etc., is not important when you are determining the position of the chord. To simplify things, all notes in the examples and exercises below are natural, but it would not change their position at all if some notes were sharp or flat. It would, however, change the name of the triad - see Naming Triads (Chapter 2).

¹This content is available online at <<http://cnx.org/content/m10877/2.17/>>.

²"Harmony" <<http://cnx.org/content/m11654/latest/>>

³"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

⁴"Harmony": Chords <<http://cnx.org/content/m11654/latest/#l0b>>

⁵"Interval" <<http://cnx.org/content/m10867/latest/#p1b>>

⁶"Interval", Figure 2: Simple Intervals <<http://cnx.org/content/m10867/latest/#fig7c>>

⁷"Interval", Figure 2: Simple Intervals <<http://cnx.org/content/m10867/latest/#fig7c>>

Exercise 1.1*(Solution on p. 5.)*

Write a triad in root position using each root given. If you need some staff paper for exercises you can print this PDF file⁸.

Build Root Position Triads:

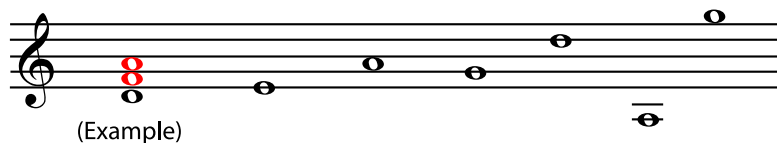


Figure 1.2

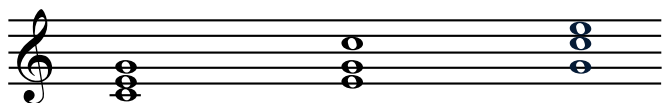
1.2 First and Second Inversions

Any other chord that has the same-named notes as a root position chord is considered to be essentially the same chord in a different **position**. In other words, all chords that have only D naturals, F sharps, and A naturals, are considered D major chords.

NOTE: **But** if you change the pitch⁹ or spelling¹⁰ of any note in the triad, you have changed the chord (see Naming Triads (Chapter 2)). For example, if the F sharps are written as G flats, or if the A's are sharp instead of natural, you have a different chord, not an inversion of the same chord. If you add notes, you have also changed the name of the chord (see Beyond Triads¹¹). **You cannot call one chord the inversion of another if either one of them has a note that does not share a name (for example "F sharp" or "B natural") with a note in the other chord.**

If the third of the chord is the lowest note, the chord is in **first inversion**. If the fifth of the chord is the lowest note, the chord is in **second inversion**. A chord in second inversion may also be called a **six-four chord**, because the intervals¹² in it are a sixth and a fourth.

Three C major chords



Root Position

First Inversion

Second Inversion

Figure 1.3

⁸See the file at <<http://cnx.org/content/m10877/latest/staffpaper1.pdf>>

⁹"Pitch: Sharp, Flat, and Natural Notes" <<http://cnx.org/content/m10943/latest/>>

¹⁰"Enharmonic Spelling" <<http://cnx.org/content/m11641/latest/>>

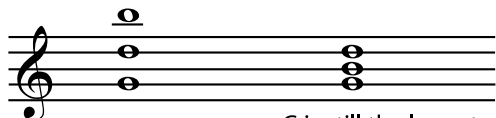
¹¹"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/>>

¹²"Interval" <<http://cnx.org/content/m10867/latest/>>

It does not matter how far the higher notes are from the lowest note, or how many of each note there are (at different octaves or on different instruments); all that matters is which note is lowest. (In fact, one of the notes may not even be written, only implied by the context of the chord in a piece of music. A practiced ear will tell you what the missing note is; we won't worry about that here.) To decide what position a chord is in, move the notes to make a stack of thirds and identify the root.

Example 1.1

Notes are G, D, and B. Rewrite as thirds:



G is still the lowest note,
so the chord was already
in root position.

Figure 1.4

Example 1.2

Notes are a G, 2 C's, and an E.
Rewrite G, C, and E as thirds:



Root position has
C as its lowest note.
Lowest note in original chord
is the fifth in root position,
so it was in second inversion.

Figure 1.5

Exercise 1.2

(Solution on p. 5.)

Rewrite each chord in root position, and name the original position of the chord.

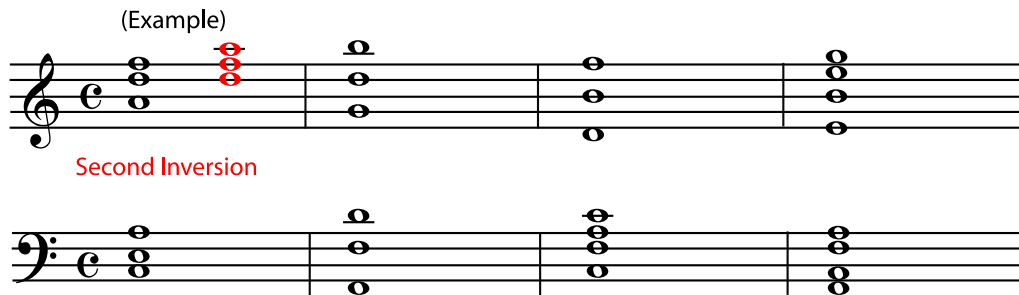


Figure 1.6

NOTE: Thanks to everyone who participated in the survey! It was very useful to me, both as a researcher and as an author, to get a better picture of my readers' goals and needs. I hope to begin updating the survey results module¹³ in April. I will also soon begin making some of the suggested additions, and emailed comments are still welcome as always.

¹³"A Survey of Users of Connexions Music Modules" <<http://cnx.org/content/m34234/latest/>>

Solutions to Exercises in Chapter 1

Solution to Exercise 1.1 (p. 1)

Build Root Position Triads:

(Example)

Figure 1.7

Solution to Exercise 1.2 (p. 3)

Second Inversion Root Position First Inversion Root Position

First Inversion Second Inversion Second Inversion First Inversion

Figure 1.8

Chapter 2

Naming Triads¹

The position (Chapter 1) that a chord is in does make a difference in how it sounds, but it is a fairly small difference. Listen² to a G major chord in three different positions.

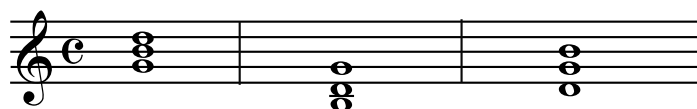


Figure 2.1: G major chord in three different positions.

A much bigger difference in the chord's sound comes from the intervals³ between the root-position notes of the chord. For example, if the B in one of the chords above was changed to a B flat, you would still have a G triad (Chapter 1), but the chord would now sound very different. So chords are named according to the intervals between the notes when the chord is in root position (Chapter 1). Listen⁴ to four different G chords.



Figure 2.2: These are also all G chords, but they are four different G chords. The intervals between the notes are different, so the chords sound very different.

¹This content is available online at <<http://cnx.org/content/m10890/2.16/>>.

²See the file at <<http://cnx.org/content/m10890/latest/Inversions.MID>>

³"Interval" <<http://cnx.org/content/m10867/latest/>>

⁴See the file at <<http://cnx.org/content/m10890/latest/GChords.MID>>

2.1 Major and Minor Chords

The most commonly used triads (Chapter 1) form major⁵ chords and minor⁶ chords. All major chords and minor chords have an interval⁷ of a perfect fifth⁸ between the root and the fifth of the chord (Chapter 1). A perfect fifth (7 half-steps) can be divided into a major third⁹ (4 half-steps) plus a minor third¹⁰ (3 half-steps). If the interval between the root and the third of the chord is the major third (with the minor third between the third and the fifth of the chord), the triad is a **major chord**. If the interval between the root and the third of the chord is the minor third (and the major third is between the third and fifth of the chord), then the triad is a **minor chord**. Listen closely to a major triad¹¹ and a minor triad¹².

Example 2.1

In both major and minor chords,
the fifth of the chord
is a perfect fifth above the root.

In major chords,
the third of the chord
is a major third above the root

In minor chords,
the third of the chord
is a minor third above the root

Figure 2.3

Example 2.2

⁵"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

⁶"Minor Keys and Scales" <<http://cnx.org/content/m10856/latest/>>

⁷"Interval" <<http://cnx.org/content/m10867/latest/>>

⁸"Interval" <<http://cnx.org/content/m10867/latest/#p21b>>

⁹"Interval": Major and Minor Intervals <<http://cnx.org/content/m10867/latest/#list22a>>

¹⁰"Interval": Major and Minor Intervals <<http://cnx.org/content/m10867/latest/#list22a>>

¹¹See the file at <<http://cnx.org/content/m10890/latest/chomj.mp3>>

¹²See the file at <<http://cnx.org/content/m10890/latest/chomin.mp3>>

Some Major and Minor Triads

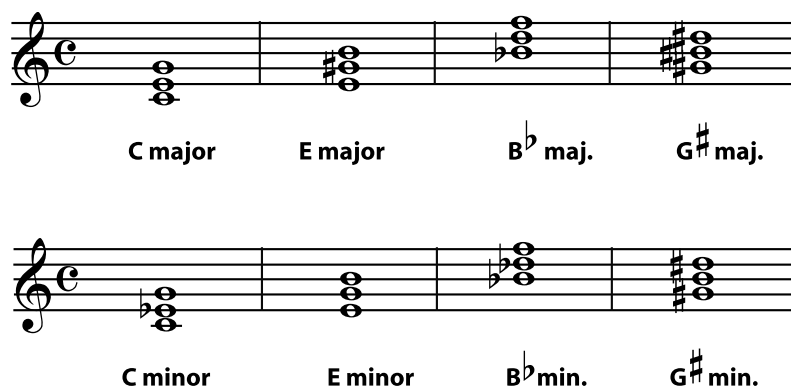


Figure 2.4 displays two rows of musical notation in treble clef, each containing four triads. The first row shows major triads: C major (C4, E4, G4), E major (E4, G4, B4), B^b major (B3, D4, F4), and G[#] major (G4, B4, D5). The second row shows minor triads: C minor (C4, E^b4, G4), E minor (E4, G4, B^b4), B^b minor (B3, D4, F^b4), and G[#] minor (G4, B4, D5).

Figure 2.4

Exercise 2.1

(Solution on p. 13.)

Write the major chord for each root given.



Figure 2.5 shows a single staff in treble clef with seven measures, each containing a single note: C4, E4, G4, B^b4, B^b4, G4, and E4.

Figure 2.5

Exercise 2.2

(Solution on p. 13.)

Write the minor chord for each root given.



Figure 2.6 shows a single staff in treble clef with seven measures, each containing a single note: C4, E4, G4, B^b4, B^b4, G4, and E4.

Figure 2.6

2.2 Augmented and Diminished Chords

Because they don't contain a perfect fifth, augmented and diminished chords have an unsettled feeling and are normally used sparingly. An **augmented chord** is built from two major thirds, which adds up to an

augmented fifth. A **diminished chord** is built from two minor thirds, which add up to a diminished fifth. Listen closely to an augmented triad¹³ and a diminished triad¹⁴.

Example 2.3

Some Augmented and Diminished Triads

The figure shows two rows of musical notation on a treble clef staff with a common time signature. The first row contains four augmented triads: C augmented (C, E, G#), E augmented (E, G#, B), Bb augmented (Bb, D, F#), and G# augmented (G#, B, D#). The second row contains four diminished triads: C diminished (C, Eb, Gb), E diminished (E, Gb, Bb), Bb diminished (Bb, Db, F), and G# diminished (G#, Bb, D).

C augmented E aug. B^b aug. G[#] aug.

C diminished E dim. B^b dim. G[#] dim.

Figure 2.7

Exercise 2.3

(Solution on p. 13.)

Write the augmented triad for each root given.

A treble clef staff with a common time signature. It contains seven whole notes: C, E, Bb, B, D, F, and G#.

Figure 2.8

Exercise 2.4

(Solution on p. 13.)

Write the diminished triad for each root given.

A treble clef staff with a common time signature. It contains seven whole notes: C, E, Bb, B, D, F, and G#.

Figure 2.9

¹³See the file at <<http://cnx.org/content/m10890/latest/choaug.mp3>>

¹⁴See the file at <<http://cnx.org/content/m10890/latest/chodim.mp3>>

Notice that you can't avoid double sharps or double flats by writing the note on a different space or line. **If you change the spelling¹⁵ of a chord's notes, you have also changed the chord's name.** For example, if, in an augmented G sharp major chord, you rewrite the D double sharp as an E natural, the triad becomes an E augmented chord.

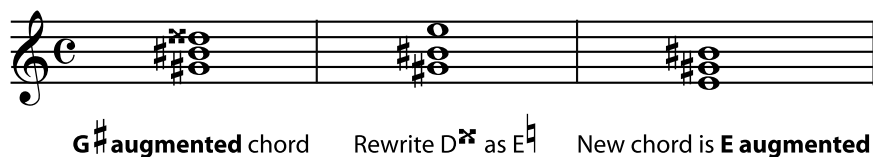


Figure 2.10: Changing the spelling of any note in a chord also changes the chord's name.

You can put the chord in a different position (Chapter 1) or add more of the same-named notes at other octaves without changing the name of the chord. But changing the note names or adding different-named notes, will change the name of the chord. Here is a summary of the intervals in triads in root position.

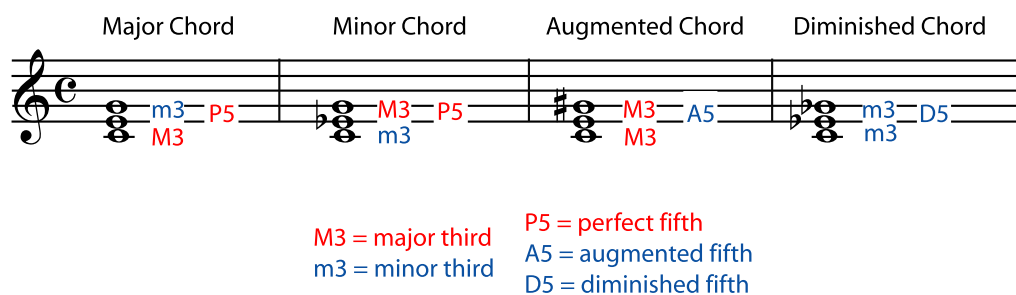


Figure 2.11

Exercise 2.5

(Solution on p. 13.)

Now see if you can identify these chords that are not necessarily in root position. Rewrite them in root position first if that helps.

¹⁵"Enharmonic Spelling" <<http://cnx.org/content/m11641/latest/>>

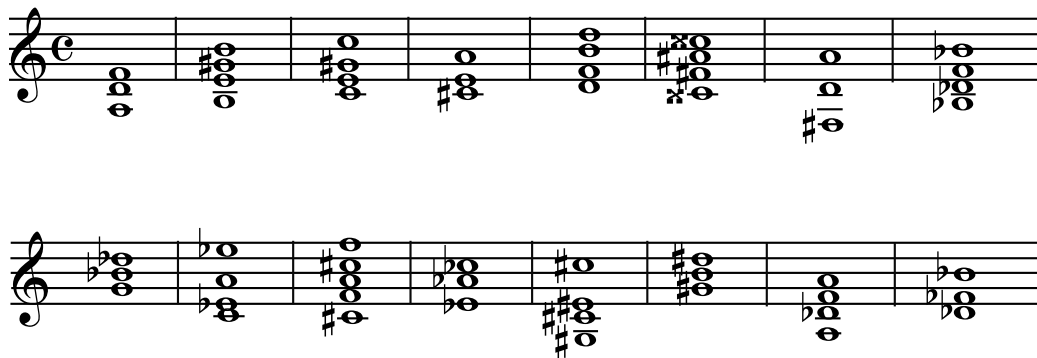


Figure 2.12

NOTE: Thanks to everyone who participated in the survey! It was very useful to me, both as a researcher and as an author, to get a better picture of my readers' goals and needs. I hope to begin updating the survey results module¹⁶ in April. I will also soon begin making some of the suggested additions, and emailed comments are still welcome as always.

¹⁶"A Survey of Users of Connexions Music Modules" <<http://cnx.org/content/m34234/latest/>>

Solutions to Exercises in Chapter 2

Solution to Exercise 2.1 (p. 9)



Figure 2.13

Solution to Exercise 2.2 (p. 9)



Figure 2.14

Solution to Exercise 2.3 (p. 10)

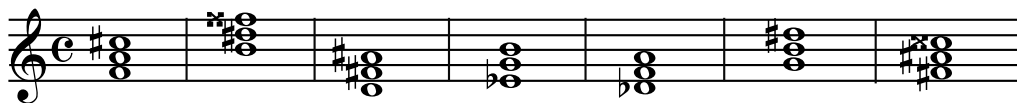


Figure 2.15

Solution to Exercise 2.4 (p. 10)



Figure 2.16

Solution to Exercise 2.5 (p. 11)

Chords are rewritten in root position.

D minor E major C aug. A major B dim. F# aug. D major B \flat minor

G dim. A dim. F aug. A \flat minor C# major G# minor D \flat aug. B \flat dim.

Figure 2.17

Chapter 3

Beginning Harmonic Analysis¹

NOTE: Are you really free to use this online resource? Join the discussion at Opening Measures².

3.1 Introduction

It sounds like a very technical idea, but basic **harmonic analysis** just means understanding how a chord is related to the key and to the other chords in a piece of music. This can be such useful information that you will find many musicians who have not studied much music theory, and even some who don't read music, but who can tell you what the I ("one") or the V ("five") chord are in a certain key.

Why is it useful to know how chords are related?

- Many standard forms³ (for example, a "twelve bar blues") follow very specific chord progressions⁴, which are often discussed in terms of harmonic relationships.
- If you understand chord relationships, you can transpose⁵ any chord progression you know to any key⁶ you like.
- If you are searching for chords to go with a particular melody⁷ (in a particular key), it is very helpful to know what chords are most likely in that key, and how they might be likely to progress from one to another.
- Improvisation requires an understanding of the chord progression.
- Harmonic analysis is also necessary for anyone who wants to be able to compose reasonable chord progressions or to study and understand the music of the great composers.

3.2 Basic Triads in Major Keys

Any chord might show up in any key, but some chords are much more likely than others. The most likely chords to show up in a key are the chords that use only the notes in that key (no accidentals⁸). So these chords have both names and numbers that tell how they fit into the key. (We'll just discuss basic triads

¹This content is available online at <<http://cnx.org/content/m11643/1.20/>>.

²<http://openingmeasures.com/open-education/40/are-the-education-resources-at-Connexions-really-free/>

³"Form in Music" <<http://cnx.org/content/m10842/latest/>>

⁴"Harmony": Chords <<http://cnx.org/content/m11654/latest/#10b>>

⁵"Transposition: Changing Keys" <<http://cnx.org/content/m10668/latest/>>

⁶"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

⁷"Melody" <<http://cnx.org/content/m11647/latest/>>

⁸"Pitch: Sharp, Flat, and Natural Notes" <<http://cnx.org/content/m10943/latest/#p0e>>

(Chapter 1) for the moment, not seventh chords⁹ or other added-note¹⁰ or altered¹¹ chords.) The chords are numbered using Roman numerals from I to vii.

Chords in the keys of C major and D major

	C	Dm	Em	F	G	Am	Bdim
C major							
	I	ii	iii	IV	V	vi	vii ^o
	D	Em	F [♯] m	G	A	Bm	C [♯] dim
D major							
	I	ii	iii	IV	V	vi	vii ^o

Figure 3.1: To find all the basic chords in a key, build a simple triad (in the key) on each note of the scale. You'll find that although the chords change from one key to the next, the **pattern** of major and minor chords is always the same.

Exercise 3.1

(Solution on p. 24.)

Write and name the chords in G major and in B flat major. (Hint: Determine the key signature¹² first. Make certain that each chord begins on a note in the major scale¹³ and contains only notes in the key signature.) If you need some staff paper, you can print this PDF file¹⁴

You can find all the basic triads that are possible in a key by building one triad, in the key, on each note of the scale (each **scale degree**). One easy way to name all these chords is just to number them: the chord that starts on the first note of the scale is "I", the chord that starts on the next scale degree is "ii", and so on. Roman numerals are used to number the chords. Capital Roman numerals are used for major chords (Section 2.1: Major and Minor Chords) and small Roman numerals for minor chords (Section 2.1: Major and Minor Chords). The diminished chord (Section 2.2: Augmented and Diminished Chords) is in small Roman numerals followed by a small circle. Because major scales always follow the same pattern, the pattern of major and minor chords is also the same in any major key. The chords built on the first, fourth, and fifth degrees of the scale are always major chords (I, IV, and V). The chords built on the second, third, and sixth degrees of the scale are always minor chords (ii, iii, and vi). The chord built on the seventh degree of the scale is a diminished chord.

NOTE: Notice that IV in the key of B flat is an E flat major chord, not an E major chord, and vii in the key of G is F sharp diminished, not F diminished. If you can't name the scale notes in a

⁹"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/#p1a>>

¹⁰"Beyond Triads: Naming Other Chords": Section Added Notes, Suspensions, and Extensions <<http://cnx.org/content/m11995/latest/#s2>>

¹¹"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/#p6a>>

¹²"Key Signature" <<http://cnx.org/content/m10881/latest/>>

¹³"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

¹⁴See the file at <<http://cnx.org/content/m11643/latest/staffpaper1.pdf>>

key, you may find it difficult to predict whether a chord should be based on a sharp, flat, or natural note. This is only one reason (out of many) why it is a good idea to memorize all the scales. (See Major Keys and Scales¹⁵.) However, if you don't plan on memorizing all the scales at this time, you'll find it useful to memorize at least the most important chords (start with I, IV, and V) in your favorite keys.

3.3 A Hierarchy of Chords

Even among the chords that naturally occur in a key signature, some are much more likely to be used than others. In most music, the most common chord is I. In Western music¹⁶, I is the tonal center¹⁷ of the music, the chord that feels like the "home base" of the music. As the other two major chords in the key, IV and V are also likely to be very common. In fact, the most common added-note chord in most types of Western music is a V chord (the dominant chord (Section 3.4: Naming Chords Within a Key)) with a minor seventh¹⁸ added (V7). It is so common that this particular flavor of seventh¹⁹ (a major chord with a minor seventh added) is often called a **dominant seventh**, regardless of whether the chord is being used as the V (the dominant) of the key. Whereas the I chord feels most strongly "at home", V7 gives the strongest feeling of "time to head home now". This is very useful for giving music a satisfying ending. Although it is much less common than the V7, the diminished vii chord (often with a diminished seventh (Section 2.2: Augmented and Diminished Chords) added), is considered to be a harmonically unstable chord that strongly wants to resolve to I. Listen to these very short progressions and see how strongly each suggests that you must be in the key of C: C (major) chord(I)²⁰; F chord to C chord (IV - I)²¹; G chord to C chord (V - I)²²; G seventh chord to C chord (V7 - I)²³; B diminished seventh chord to C chord (viidim7 - I)²⁴ (Please see Cadence²⁵ for more on this subject.)

Many folk songs and other simple tunes can be accompanied using only the I, IV and V (or V7) chords of a key, a fact greatly appreciated by many beginning guitar players. Look at some chord progressions from real music.

¹⁵"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

¹⁶"What Kind of Music is That?" <<http://cnx.org/content/m11421/latest/>>

¹⁷"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

¹⁸"Interval": Major and Minor Intervals <<http://cnx.org/content/m10867/latest/#list22a>>

¹⁹"Beyond Triads: Naming Other Chords": Section Seventh Chords <<http://cnx.org/content/m11995/latest/#s1>>

²⁰See the file at <<http://cnx.org/content/m11643/latest/Cchord.mid>>

²¹See the file at <<http://cnx.org/content/m11643/latest/FchordCchord.mid>>

²²See the file at <<http://cnx.org/content/m11643/latest/GchordCchord.mid>>

²³See the file at <<http://cnx.org/content/m11643/latest/G7chordCchord.mid>>

²⁴See the file at <<http://cnx.org/content/m11643/latest/BdimchordCchord.MID>>

²⁵"Cadence in Music" <<http://cnx.org/content/m12402/latest/>>

Some chord progressions

A Common Twelve Bar Blues:

I	I	I	I7
IV7	IV7	I	I
V7	V7	I	I

Verse of "Jingle Bells"

I	I	I	IV
IV	V7	V7	I
I	I	I	IV
IV	V7	V7	I

Chorus of "Bye Bye, Love"

IV	I	IV	I
IV	I	V7	I

Figure 3.2: Much Western music is harmonically pretty simple, so it can be very useful just to know I, IV, and V in your favorite keys. This figure shows progressions as a list of chords (read left to right as if reading a paragraph), one per measure.

A lot of folk music, blues, rock, marches, and even some classical music is based on simple chord progressions, but of course there is plenty of music that has more complicated harmonies. Pop and jazz in particular often include many chords with added²⁶ or altered²⁷ notes. Classical music also tends to use more complex chords in greater variety, and is very likely to use chords that are not in the key.

²⁶"Beyond Triads: Naming Other Chords": Section Added Notes, Suspensions, and Extensions
<<http://cnx.org/content/m11995/latest/#s2>>

²⁷"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/#p6a>>

More Complex Chord Progressions

Chorus of "Love Me Tender"

I	III7	vi	I7
IVM7	iv	I	I
v6	VI7	II7	II7
V7sus4	V7	I	I

Beginning of Liszt's "Liebestraum"

I	III7	Vi7	II7
ii7	V7	I Idim	I

Figure 3.3: Some music has more complex harmonies. This can include more unusual chords such as major sevenths, and chords with altered²⁸ notes such as sharp fives. It may also include more basic chords that aren't in the key, such as I diminished and II (major), or even chords based on notes that are not in the key such as a sharp IV chord. (Please see Beyond Triads²⁹ to review how to read chord symbols.)

Extensive study and practice are needed to be able to identify and understand these more complex progressions. It is not uncommon to find college-level music theory courses that are largely devoted to harmonic analysis and its relationship to musical forms. This course will go no further than to encourage you to develop a basic understanding of what harmonic analysis is about.

3.4 Naming Chords Within a Key

So far we have concentrated on identifying chord relationships by number, because this system is commonly used by musicians to talk about every kind of music from classical to jazz to blues. There is another set of names that is commonly used, particularly in classical music, to talk about harmonic relationships. Because numbers are used in music to identify everything from beats to intervals to harmonics to what fingering to use, this naming system is sometimes less confusing.

²⁸"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/#p6a>>

²⁹"Beyond Triads: Naming Other Chords": Section Chord Symbols <<http://cnx.org/content/m11995/latest/#s5>>

I	=	Tonic
ii	=	Supertonic
iii	=	Mediant
IV	=	Subdominant
V	=	Dominant
vi	=	Submediant
vii ^o	=	Subtonic, or Leading Tone

Figure 3.4

Exercise 3.2*(Solution on p. 24.)***Name the chord.**

1. Dominant in C major
2. Subdominant in E major
3. Tonic in G sharp major
4. Mediant in F major
5. Supertonic in D major
6. Submediant in C major
7. Dominant seventh in A major

Exercise 3.3*(Solution on p. 24.)*

The following chord progression is in the key of G major. Identify the relationship of each chord to the key by both name and number. Which chord is not in the key? Which chord in the key has been left out of the progression?

G	C	Am	Em
A	D	Bm	D7
G			

Figure 3.5

3.5 Minor Keys

Since minor scales³⁰ follow a different pattern of intervals³¹ than major scales, they will produce chord progressions with important differences from major key chord progressions.

³⁰"Minor Keys and Scales" <<http://cnx.org/content/m10856/latest/>>

³¹"Interval" <<http://cnx.org/content/m10867/latest/>>

Exercise 3.4*(Solution on p. 25.)*

Write (triad) chords that occur in the keys of A minor, E minor, and D minor. Remember to begin each triad on a note of the natural minor³² scale and to include only notes in the scale in each chord. Which chord relationships are major? Which minor? Which diminished? If you need staff paper, print this PDF file³³

Notice that the actual chords created using the major scale and its relative minor³⁴ scale are the same. For example, compare the chords in A minor (Figure 3.8) to the chords in C major (Figure 3.1 (Chords in the keys of C major and D major)). The difference is in how the chords are used. As explained above (p. 17), if the key is C major, the chord progression³⁵ will likely make it clear that C is the tonal center³⁶ of the piece, for example by featuring the bright-sounding (major) tonic, dominant, and subdominant chords (C major, G major or G7, and F major), particularly in strong cadences³⁷ that end on a C chord.

If the piece is in A minor, on the other hand, it will be more likely to feature (particularly in cadences) the tonic, dominant, and subdominant of A minor (the A minor, D minor, and E minor chords). These chords are also available in the key of C major, of course, but they will not be given such a prominent place.

As mentioned above (p. 17), the "flavor" of sound that is created by a major chord, with a minor seventh added, gives a particularly dominant (wanting-to-go-to-the-home-chord) sound, which in turn gives a more strong feeling of tonality to a piece of music. Because of this, many minor pieces change the major chord so that it is a dominant seventh, even though that requires using a note that is not in the key.

Exercise 3.5*(Solution on p. 25.)*

Look at the chords in Figure 3.8. What note of each scale would have to be changed in order to make v major? Which other chords would be affected by this change? What would they become, and are these altered chords also likely to be used in the minor key?

The point of the harmonic minor³⁸ scale is to familiarize the musician with this common feature of harmony, so that the expected chords become easy to play in every minor key. There are also changes that can be made to the melodic³⁹ lines of a minor-key piece that also make it more strongly tonal. This involves raising (by one half step⁴⁰) both the sixth and seventh scale notes, but only when the melody is ascending. So the musician who wants to become familiar with melodic patterns in every minor key will practice melodic minor⁴¹ scales, which use different notes for the ascending and descending scale.

You can begin practicing harmonic analysis by practicing identifying whether a piece is in the major key or in its relative minor. Pick any piece of music for which you have the written music, and use the following steps to determine whether the piece is major or minor:

Is it Major or Minor?

- Identify the chords used in the piece, particularly at the very end, and at other important cadences⁴² (places where the music comes to a stopping or resting point). This is an important first step that may require practice before you become good at it. Try to start with simple music which either includes the names of the chords, or has simple chords in the accompaniment that will be relatively easy to find and name. If the chords are not named for you and you need to review how to name them just by looking at the written notes, see Naming Triads (Chapter 2) and Beyond Triads⁴³.
- Find the key signature⁴⁴.

³²"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

³³See the file at <<http://cnx.org/content/m11643/latest/staffpaper1.pdf>>

³⁴"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

³⁵"Harmony": Chords <<http://cnx.org/content/m11654/latest/#l0b>>

³⁶"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/#p1a>>

³⁷"Cadence in Music" <<http://cnx.org/content/m12402/latest/>>

³⁸"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

³⁹"Melody" <<http://cnx.org/content/m11647/latest/>>

⁴⁰"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

⁴¹"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

⁴²"Cadence in Music" <<http://cnx.org/content/m12402/latest/>>

⁴³"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/>>

⁴⁴"Key Signature" <<http://cnx.org/content/m10881/latest/>>

- Determine both the major key⁴⁵ represented by that key signature, and its relative minor⁴⁶ (the minor key that has the same key signature).
- Look at the very end of the piece. Most pieces will end on the tonic chord. If the final chord is the tonic of either the major or minor key for that key signature, you have almost certainly identified the key.
- If the final chord is not the tonic of either the major or the minor key for that key signature, there are two possibilities. One is that the music is not in a major or minor key! Music from other cultures, as well as some jazz, folk, modern, and pre-Baroque⁴⁷ European music are based on other modes or scales. (Please see Modes and Ragas⁴⁸ and Scales that aren't Major or Minor⁴⁹ for more about this.) If the music sounds at all "exotic" or "unusual", you should suspect that this may be the case.
- If the final chord is not the tonic of either the major or the minor key for that key signature, but you still suspect that it is in a major or minor key (for example, perhaps it has a "repeat and fade" ending which avoids coming to rest on the tonic), you may have to study the rest of the music in order to discern the key. Look for important cadences before the end of the music (to identify I). You may be able to identify, just by listening, when the piece sounds as if it is approaching and landing on its "resting place". Also look for chords that have that "dominant seventh" flavor (to identify V). Look for the specific accidentals⁵⁰ that you would expect if the harmonic minor⁵¹ or melodic minor⁵² scales were being used. Check to see whether the major or minor chords are emphasized overall. Put together the various clues to reach your final decision, and check it with your music teacher or a musician friend if possible.

3.6 Modulation

Sometimes a piece of music temporarily moves into a new key. This is called **modulation**. It is very common in traditional classical music; long symphony and concerto movements almost always spend at least some time in a different key (usually a closely related key⁵³ such as the dominant (Section 3.4: Naming Chords Within a Key) or subdominant (Section 3.4: Naming Chords Within a Key), or the relative minor or relative major⁵⁴), to keep things interesting. Shorter works, even in classical style, are less likely to have complete modulations. In most styles of music, a slow, gradual modulation to the new key (and back) seems more natural, and abrupt modulations can seem unpleasant and jarring. But implied modulations, in which the tonal center seems to suddenly shift for a short time, can be very common in some shorter works (jazz standards, for example). As in longer works, modulation, with its new set of chords, is a good way to keep a piece interesting. If you find that the chord progression in a piece of music suddenly contains many chords that you would not expect in that key, it may be that the piece has modulated. Lots of accidentals, or even an actual change of key signature⁵⁵, are other clues that the music has modulated.

A new key signature⁵⁶ may help you to identify the modulation key. If there is not a change of key signature, remember that the new key is likely to contain whatever accidentals⁵⁷ are showing up. It is also likely that many of the chords in the progression will be chords that are common in the new key. Look particularly for tonic chords and dominant sevenths. The new key is likely to be closely related⁵⁸ to the

⁴⁵"Major Keys and Scales" <<http://cnx.org/content/m10851/latest/>>

⁴⁶"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

⁴⁷"Music of the Baroque Period" <<http://cnx.org/content/m14737/latest/>>

⁴⁸"Modes and Ragas: More Than just a Scale" <<http://cnx.org/content/m11633/latest/>>

⁴⁹"Scales that aren't Major or Minor" <<http://cnx.org/content/m11636/latest/>>

⁵⁰"Pitch: Sharp, Flat, and Natural Notes" <<http://cnx.org/content/m10943/latest/#p0e>>

⁵¹"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

⁵²"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

⁵³"The Circle of Fifths" <<http://cnx.org/content/m10865/latest/>>

⁵⁴"Minor Keys and Scales": Section Relative Minor and Major Keys <<http://cnx.org/content/m10856/latest/#s3>>

⁵⁵"Key Signature" <<http://cnx.org/content/m10881/latest/>>

⁵⁶"Key Signature" <<http://cnx.org/content/m10881/latest/>>

⁵⁷"Pitch: Sharp, Flat, and Natural Notes" <<http://cnx.org/content/m10943/latest/#p0e>>

⁵⁸"The Circle of Fifths" <<http://cnx.org/content/m10865/latest/>>

original key, but another favorite trick in popular music is to simply move the key up one whole step⁵⁹, for example from C major to D major. Modulations can make harmonic analysis much more challenging, so try to become comfortable analyzing easier pieces before tackling pieces with modulations.

3.7 Further Study

Although the concept of harmonic analysis is pretty basic, actually analyzing complex pieces can be a major challenge. This is one of the main fields of study for those who are interested in studying music theory at a more advanced level. One next step for those interested in the subject is to become familiar with all the ways notes may be added to basic triads. (Please see *Beyond Triads*⁶⁰ for an introduction to that subject.) At that point, you may want to spend some time practicing analyzing some simple, familiar pieces. Depending on your interests, you may also want to spend time creating pleasing chord progressions by choosing chords from the correct key that will complement a melody that you know. As of this writing, the site *Music Theory for Songwriters*⁶¹ featured "chord maps" that help the student predict likely chord progressions.

For more advanced practice, look for music theory books that focus entirely on harmony or that spend plenty of time analyzing harmonies in real music. (Some music history textbooks are in this category.) You will progress more quickly if you can find books that focus on the music genre that you are most interested in (there are books specifically about jazz harmony, for example).

⁵⁹"Half Steps and Whole Steps" <<http://cnx.org/content/m10866/latest/>>

⁶⁰"Beyond Triads: Naming Other Chords" <<http://cnx.org/content/m11995/latest/>>

⁶¹<http://www.chordmaps.com>

Solutions to Exercises in Chapter 3

Solution to Exercise 3.1 (p. 16)

Figure 3.6 displays two musical staves showing chord diagrams for the G major and B \flat major scales. The G major scale is shown with chords G, Am, Bm, C, D, Em, and F \sharp dim. The B \flat major scale is shown with chords B \flat , Cm, Dm, E \flat , F, Gm, and Adim. Roman numerals (I, ii, iii, IV, V, vi, vii $^\circ$) are provided below each chord.

Figure 3.6

Solution to Exercise 3.2 (p. 20)

1. G major (G)
2. A major (A)
3. G sharp major (G \sharp)
4. A minor (Am)
5. E minor (Em)
6. A minor (Am)
7. E seventh (E7)

Solution to Exercise 3.3 (p. 20)

I	IV	ii	vi
G	C	Am	Em
tonic	subdominant	supertonic	submediant
II	V	iii	V7
A	D	Bm	D7
not in key*	dominant	mediant	dominant seventh
I			
G			
tonic			

There is no subtonic in this progression.

*It is A minor (with a C natural), not A major (with a C sharp) that belongs in this key. An A major chord can sound good in the key of G major, however. It is the dominant of the dominant (D major), so playing an A major chord can sometimes make the music feel like it has temporarily moved to the (closely related) key of D major. This type of harmonic complexity helps keep a piece of music interesting.

Figure 3.7

Solution to Exercise 3.4 (p. 20)

The tonic, subdominant, and dominant are minor (i, iv, and v). The mediant, submediant, and subtonic are major (III, VI, and VII). The supertonic (ii) is diminished.

Figure 3.8 displays three musical staves showing chord progressions for different minor scales. The top staff is for a minor, showing chords i, ii°, III, iv, v, VI, VII. The middle staff is for e minor, showing chords i, ii°, III, iv, v, VI, VII with a sharp sign above the VII chord. The bottom staff is for d minor, showing chords i, ii°, III, iv, v, VI, VII with a flat sign above the VII chord.

Figure 3.8

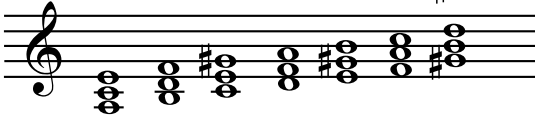
Solution to Exercise 3.5 (p. 21)

The seventh degree of the scale must be raised by one half step to make the v chord major. If the seventh scale note is raised, the III chord becomes augmented, and the vii chord becomes a diminished chord (based on the sharp vii rather than the vii). The augmented III chord would not be particularly useful in

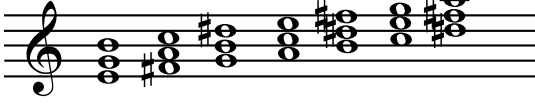
the key, but, as mentioned above (p. 17), a diminished seventh chord based on the leading tone (here, the sharp vii) is sometimes used in cadences⁶².

a (harmonic) minor

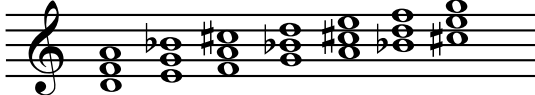
i ii^o III⁺ iv V VI #vii^o



e (harmonic) minor



d (harmonic) minor



The figure displays three musical staves, each representing a different harmonic minor scale. Above each staff, the Roman numeral symbols for the seven chords are listed: i, ii^o, III⁺, iv, V, VI, and #vii^o. The first staff is for the a (harmonic) minor scale, the second for the e (harmonic) minor scale, and the third for the d (harmonic) minor scale. Each staff shows the chord symbols above a series of seven chord diagrams (triads) on a five-line staff with a treble clef. The chords are: i (three notes), ii^o (three notes), III⁺ (three notes), iv (three notes), V (three notes), VI (three notes), and #vii^o (three notes).

Figure 3.9

⁶²"Cadence in Music" <<http://cnx.org/content/m12402/latest/>>

Chapter 4

Seventh Chords and Inversions¹

We learned earlier that triads can be created on each scale step or each scale degree. In a similar manner, seventh chords can be created by stacking additional notes a third above the triads. Root position seventh chords when stacked as closely as possible have all notes either on spaces or all on lines. For instance, see the example of seventh chords on scale degrees in C Major (Figure 1):

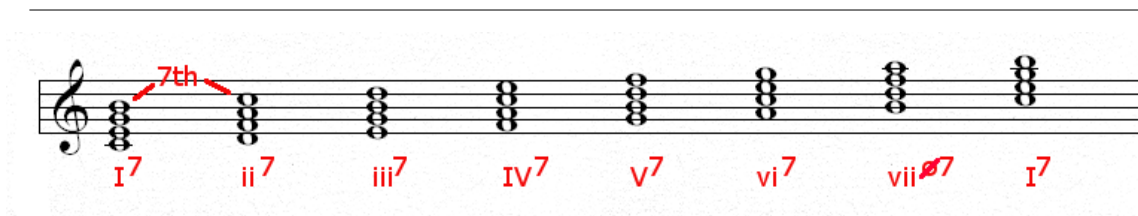


Figure 4.1

Let's carefully examine the quality of each chord. The triads (lowest three notes) are either major, minor, or diminished when built on the C major scale. The sevenths are either major or minor 7ths (Figure 2):

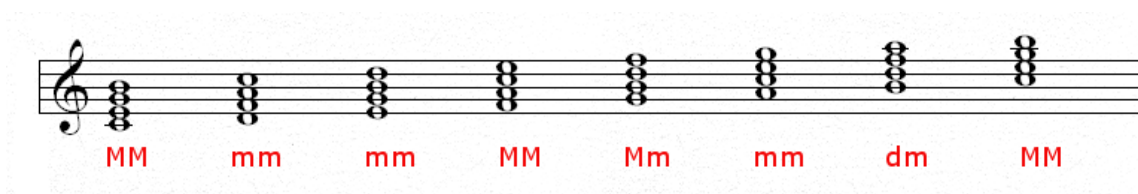


Figure 4.2

The first letter in Figure 2 refers to the quality of the triad; the second letter to the quality of the seventh. For instance, in the first chord built on C the triad is major, "M," and the seventh is also major, "M." In the second seventh chord both the triad and seventh are minor, "m."

¹This content is available online at <<http://cnx.org/content/m25129/1.2/>>.

One seventh chord deserves special attention. The dominant seventh chord is the most prominent seventh chord in common practice music. It is distinct from the other seventh chords since it is the only one possessing a major triad with a minor seventh. The dominant seventh, whether in a major or minor key, is always a major triad with a minor seventh above the root of the chord. Figure 3 supplies a dominant seventh chord built on G:



Figure 4.3

Inversions of Seventh Chords

Here is an easy way to remember the inversions of seventh chords:

7 – 65 – 43 – 2

Notice the descending pattern of numbers. The root position and three inversions use this order of numbers to label the chords. Figure 4 gives a tonic seventh chord built on C with the root position and inversions:

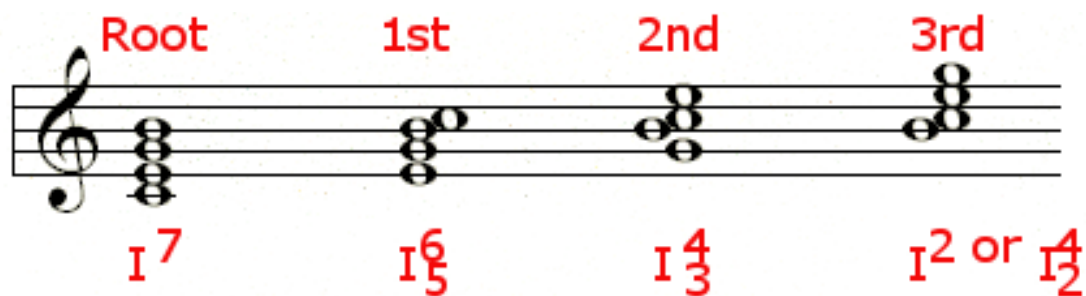


Figure 4.4

Figure 5 demonstrates how the inversions are obtained. The bass note (C4) in the root position triad is moved up an octave to C5 for the 1st inversion. Similarly the bass notes in the 1st inversion is transposed up an octave for the 2nd inversion, etc.

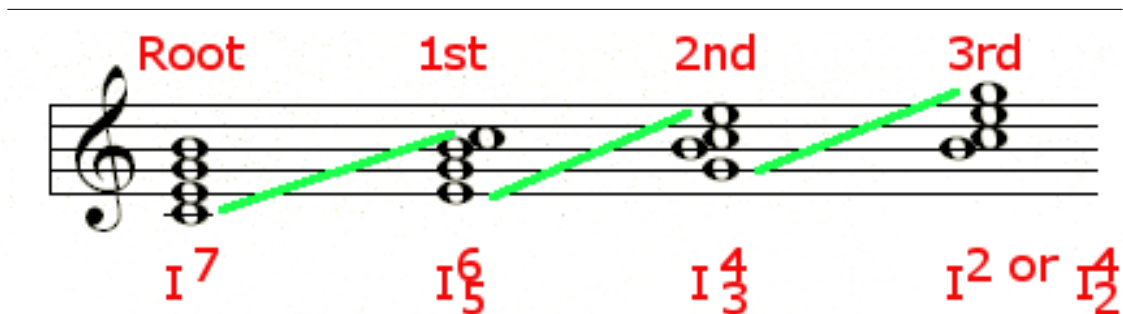


Figure 4.5

Observe that an alternative way to label the 3rd inversion is 4 over 2.

Recognizing Inversions of Seventh Chords

Take these steps to recognize inversions of seventh chords. 1) stack the chord in closed position (as closely as possible) with the bass as the lowest note. Remove duplicated pitches. 2) find the second in the chord. The root of the chord will be the top note of that second. 3) If the root is the top note the chord is 1st inversion, 2nd from the top—2nd inversion, 3rd from the top—3rd inversion. Figures 6 and 9 supplies examples of the process:

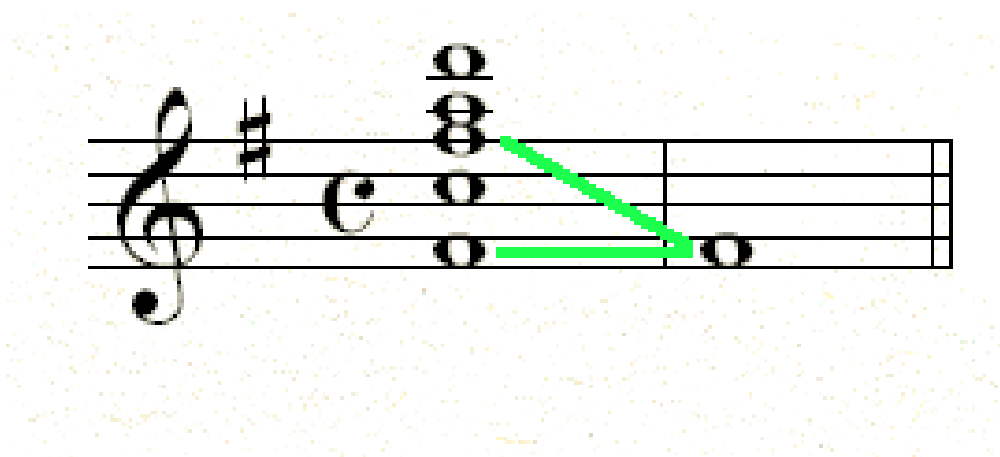


Figure 4.6

The bass is written first to the right. The redundant (extra) F# is not added to the revised chord.

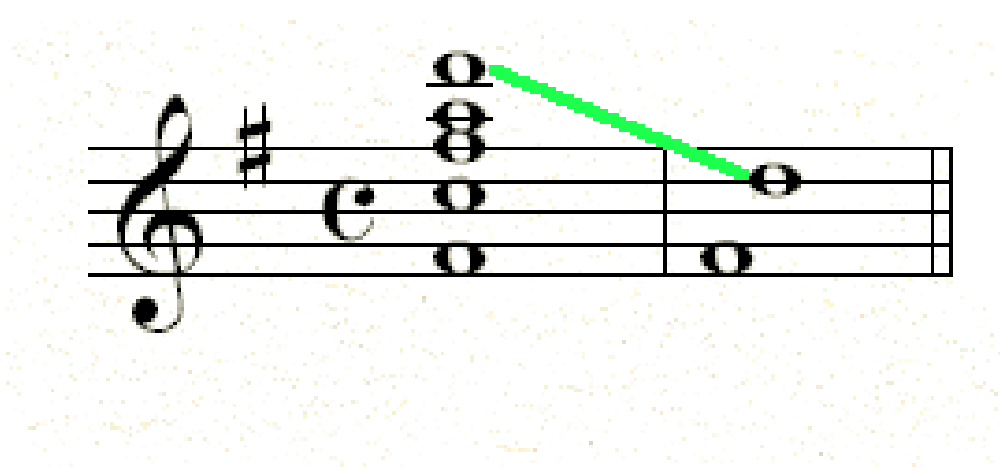


Figure 4.7

The D is added to the new chord.

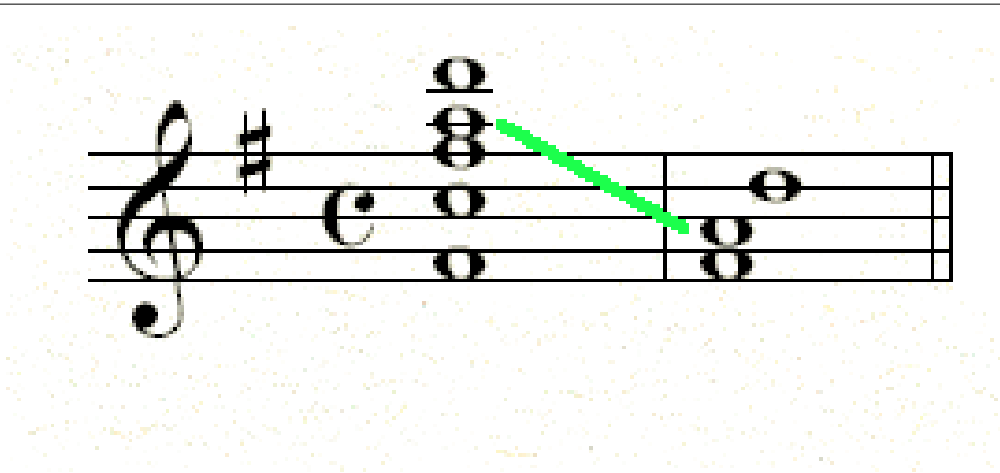


Figure 4.8

The A is added.

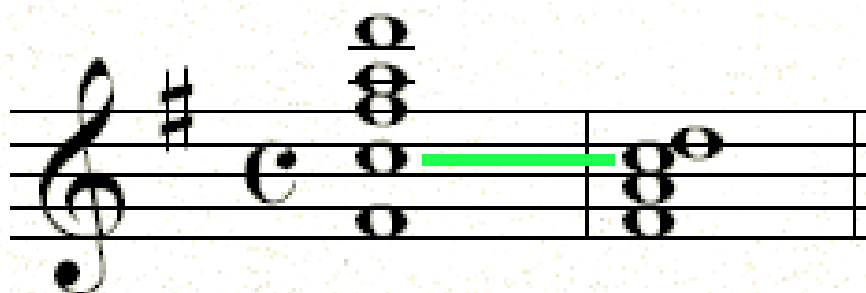


Figure 4.9

Finally the C is added and all the notes are in the new closed position chord. Notice that the second—the non-third interval—is easy to identify. All the chord tones are on spaces except for the root—D5. This root forms a second with the note below it. Since the root is on the top of the chord, this is a first inversion seventh chord. Here is the harmonic analysis (Figure 10):

Figure 4.10

Practice labeling these seventh chords in G major (Answers below)

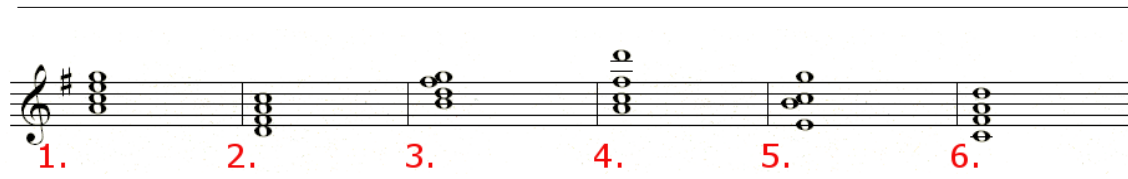


Figure 4.11

Answers: G Major: 1. ii7, 2. V7, 3. I65, 4. V43, 5. IV65, 6. V2

Index of Keywords and Terms

Keywords are listed by the section with that keyword (page numbers are in parentheses). Keywords do not necessarily appear in the text of the page. They are merely associated with that section. *Ex.* apples, § 1.1 (1) **Terms** are referenced by the page they appear on. *Ex.* apples, 1

- A** augmented chord, 9
augmented chords, § 2(7)
- C** chord, § 1(1), § 4(27)
chords, § 2(7), § 3(15)
- D** diminished chord, 10
diminished chords, § 2(7)
dominant, § 3(15), § 4(27)
dominant seventh, 17
- F** fifth of the chord, 1
first inversion, § 1(1), 2
- H** harmonic analysis, 15
harmony, § 3(15)
- I** Inversion, § 4(27)
inversions, § 1(1)
- L** leading tone, § 3(15)
- M** major chord, 8
major chords, § 2(7)
- mediant, § 3(15)
minor chord, 8
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modulation, 22
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- P** position, 2
- R** root, 1
root position, § 1(1), 1
- S** scale degree, 16
second inversion, § 1(1), 2
Seventh, § 4(27)
six-four chord, 2
subdominant, § 3(15)
submediant, § 3(15)
subtonic, § 3(15)
supertonic, § 3(15)
- T** third of the chord, 1
tonic, § 3(15)
triad, § 1(1)
Triads, 1, § 2(7)

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