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Spelling Subdominant-Function Triads and Seventh Chords in Major and Minor Keys Utilizing a Patterned Approach

Paula J. Telesco

Spelling Subdominant-Function Triads and Seventh Chords in Major and Minor Keys Utilizing a Patterned Approach

Dr. Paula J. Telesco

Diatonic chords that have a subdominant function (also called a predominant function) play an important role in tonal music and tonal chord progressions. They precede the dominant chord and provide impetus to move to the dominant. This is a result of their containing two pitches that surround the dominant note: $\hat{4}$ and $\hat{6}$ (*fa* and *la*, or *le* in minor), with $\hat{4}$ usually being in the bass and $\hat{6}$ usually being in an upper voice. This explains why the ii chord is typically found in first inversion—that puts the subdominant note, $\hat{4}$, in the bass. One might conceive of these notes as analogous to upper and lower leading tones—they converge on the dominant from opposite directions.

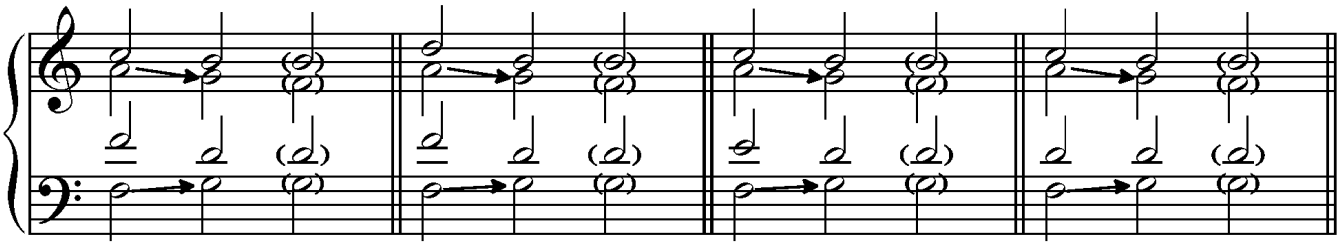
The two diatonic triads that contain $\hat{4}$ and $\hat{6}$ are the subdominant and supertonic chords:

1. In major keys: IV ($\hat{4}$–↑$\hat{6}$–$\hat{1}$, *fa–la–do*) and ii ($\hat{2}$–$\hat{4}$–↑$\hat{6}$, *re–fa–la*)
2. In minor keys: iv ($\hat{4}$–♭$\hat{6}$/↓$\hat{6}$–$\hat{1}$, *fa–le–do*) and ii° ($\hat{2}$–$\hat{4}$–♭$\hat{6}$/↓$\hat{6}$, *re–fa–le*)[1]

Each of these chords exists as a seventh chord as well. All diatonic subdominant-function seventh chords contain $\hat{4}$, $\hat{6}$ and $\hat{1}$:

1. In major keys: IV^7 ($\hat{4}$–↑$\hat{6}$–$\hat{1}$–$\hat{3}$, *fa–la–do-mi*) and ii^7 ($\hat{2}$–$\hat{4}$–↑$\hat{6}$–$\hat{1}$, *re–fa–la–do*)
2. In minor keys: iv^7 ($\hat{4}$–♭$\hat{6}$/↓$\hat{6}$–$\hat{1}$–$\hat{3}$, *fa–le–do-me*) and ii^{ø7} ($\hat{2}$–$\hat{4}$–♭$\hat{6}$/↓$\hat{6}$–$\hat{1}$, *re–fa–le–do*)

While the student worksheet does not require any part writing, I have included below several examples of typical part writing for the convenience of the instructor, who may wish to share these with their students. The arrows in the examples illustrate how, when these chords are written in four voices, $\hat{4}$ in the bass moves up to $\hat{5}$, and $\hat{6}$ in an upper voice moves down to $\hat{5}$. These chords can progress to either V or V^7:



[1] I use ↑$\hat{6}$ to refer to the major 6th scale degree, e.g., A♮ in C major, and ♭$\hat{6}$/↓$\hat{6}$ to refer to the minor 6th scale degree, e.g., A♭ in the key of c minor. $\hat{6}$ without an arrow refers to the 6th scale degree in general without specifically referring to a major or minor key.

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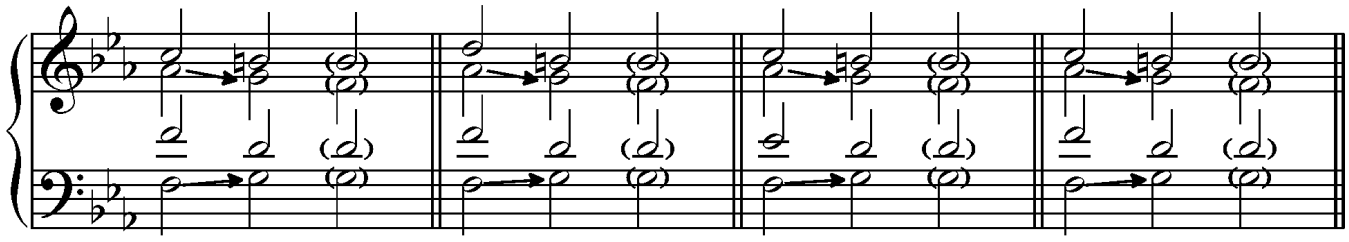
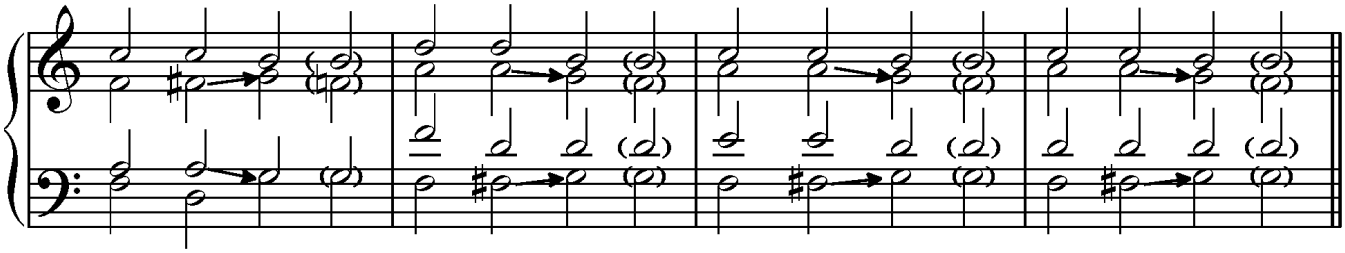
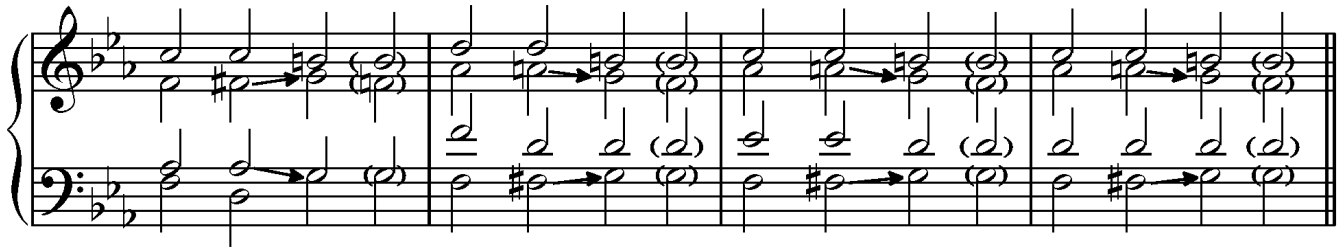


All of these diatonic subdominant-function chords have chromaticized versions as well, all of which progress to V even more strongly than their diatonic counterparts because they contain either ♯$\hat{4}$, ♭$\hat{6}$/↓$\hat{6}$, or both. This creates half-step motion pushing to $\hat{5}$, the root of the dominant chord, as ♯$\hat{4}$ and/or ♭$\hat{6}$/↓$\hat{6}$ act as lower and/or upper leading tones. These chromaticized subdominant-function chords are the following:

1. Secondary dominants
2. Secondary leading-tone chords
3. Neapolitan 6th chords
4. Italian, German, and French Augmented 6ths chords

I include below examples of each to demonstrate how the chromaticized chords emerge from their diatonic counterparts and to show their typical part writing.





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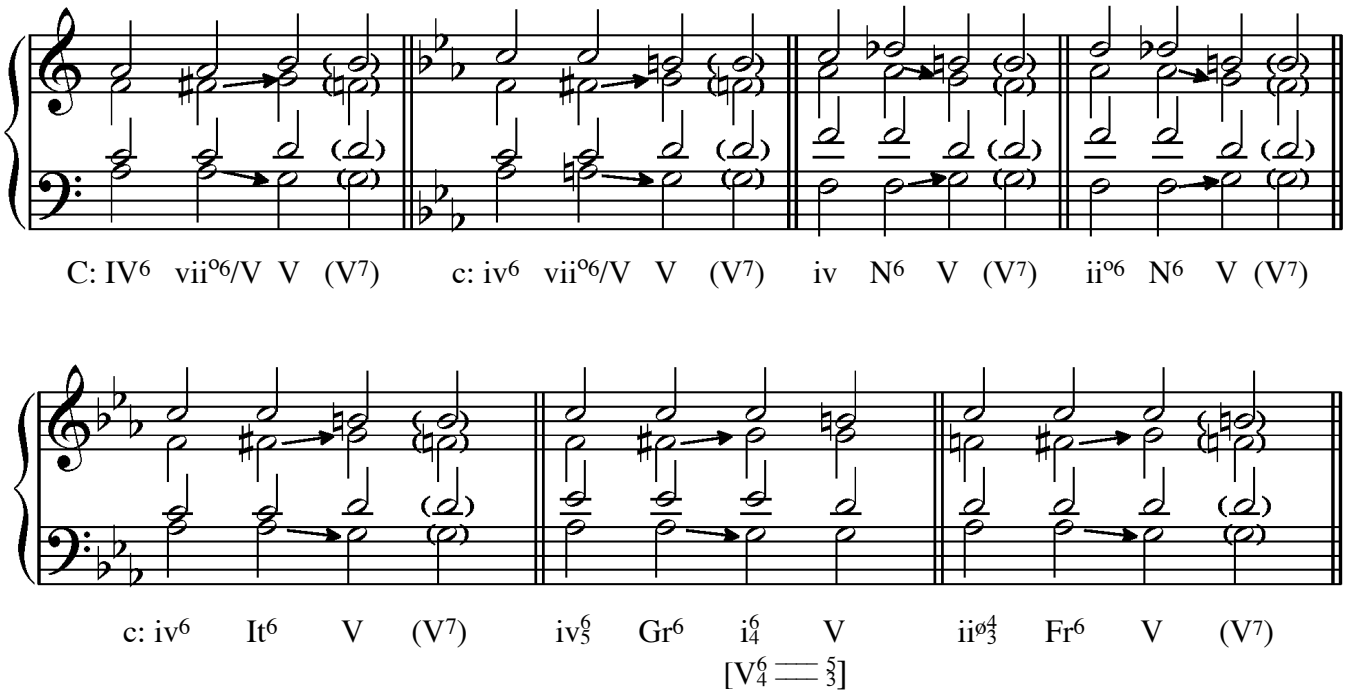
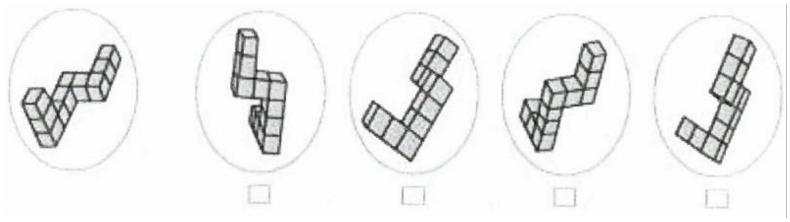


The attached worksheets offer a systematic pattern-based approach to spelling diatonic subdominant-function triads and seventh chords in all major and minor keys. Pattern recognition ability has been shown to be an important predictor of success in Music Theory courses. Nancy Rogers and Jane Clendinning have tested this correlation and their results are consistent with this assertion.[2] Rogers and Clendinning ran a study in which they administered "a battery of tests addressing basic numeracy, spatial skills, and pattern recognition."[3] Their study included several standard tests such as the following:

1. Mental rotation of an object: students have to determine which of four objects are rotations of the original object. An example follows:

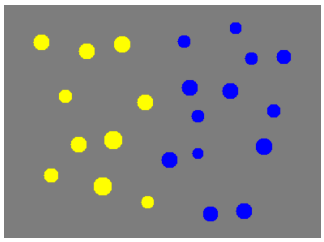


[2] Nancy Rogers, Jane Piper Clendinning, Sara Hart, and Colleen Ganley: "Specific Mathematical and Spatial Abilities Correlate with Music Theory Abilities," *Proceedings of the 14th International Conference on Music Perception and Cognition*, 2014, http://www.icmpc.org/icmpc14/files/ICMPC14_Proceedings.pdf

[3] Much has been written about the relationship between music and mathematical abilities; see, for example, Barroso, Connie, Colleen M. Ganley, Sara A. Hart, Nancy Rogers, and Jane P. Clendinning, "The Relative Importance of Math− and Music−related Cognitive and Affective Factors in Predicting Undergraduate Music Theory Achievement," *Applied Cognitive Psychology* 33 no. 5 (Sept. 1, 2019): 771–83, doi:10.1002/acp.3518.

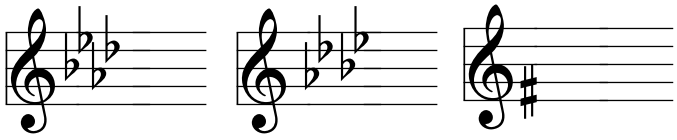
2. Geometric Invariants Test: students have to determine which of the six images in each group don't match the other five. An example follows:

3. Approximate Number System Test: students were shown collections of intermixed blue and yellow dots, with five to twenty dots per color, for 600 milliseconds (ms) and had to determine whether there was a larger number of yellow dots or a larger number of blue dots. An example is shown below.



Rogers and Clendinning also devised specifically musical tests, such as their "Standard Music Notation Recognition Test." Students saw images of common musical symbols for 500 ms and had to determine whether a given example of musical notation represented correct standard notation. A few examples follow:

1. Students had to determine whether the sharps and flats in key signatures were in the correct or incorrect order, or whether they were on the correct line or space:



2. Students had to determine whether individual notes had their stems and flags going in the correct direction:

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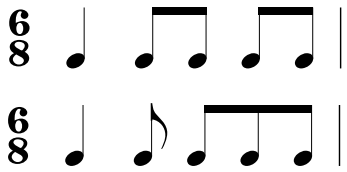
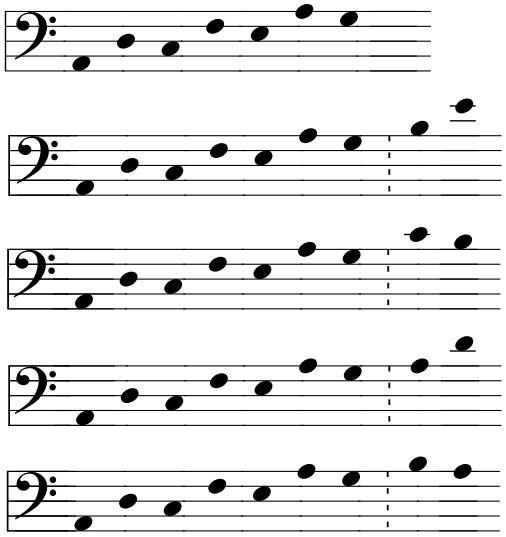
3. Students saw one-measure rhythms in either 3/4 or 6/8 and had to determine whether the beaming was correct for the given meter:



Another specifically musical test was their "Musical Pattern Continuation Test." This is analogous to the number sequence test whereby one has to determine the next number in a series of numbers. For example: 2, 4, 6 _____. Their "Musical Pattern Continuation Test" asks students to evaluate a given melodic pattern and then choose from four possible continuations the one that maintains the established melodic pattern. One such example is shown below:



Rogers and Clendinning say their "Musical Pattern Continuation Test" was the "single most successful measure" that predicted success in Music Theory, "correlating with performance in all music theory courses."

Hence, it is to students' advantage to recognize and apply simple patterns when spelling chords. The worksheet exercises promote pattern-based spelling by prompting students to reproduce a chord or harmonic pattern up one whole or half step at a time. This approach enables students to develop and utilize pattern recognition to help them learn and understand more fully a new concept. This kind of practice has the additional benefit of continuously sensitizing the student to the multitudinous patterns in music, an important skill for any musician to have. I have found that approaching all topics in a way that utilizes and reinforces pattern recognition to be a very helpful approach.

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While there is an abundance of scientific and psychological literature available on pattern recognition, I have found no such research on how one can improve or teach pattern recognition. There are various blog posts about doing number puzzles and object puzzles, much like the examples shown above, and several articles concerning using pattern recognition to teach piano to beginning students, but nothing concerning how to improve this ability for music theory studies.[4] Nevertheless, I believe that approaching musical topics as this handout and worksheet do, utilizing a pattern-based approach, supports the development of pattern awareness.

The Worksheets

Each worksheet is laid out on two or three staves (as necessary to accommodate the keys). The upper-most staves contain the white-note keys (C major, D major, etc.; c minor, d minor, etc.). The lower staves contain the flat and sharp keys, underneath their corresponding white-note keys. When working left to right across the page, the keys progress up by step through the white notes, from C to B; students transpose each chord up either a M2 or a m2 (C–D, D–E, E–F, etc.). Immediately below each white-note key is its corresponding black-note key or keys; to notate those keys, students need to transpose up or down by an augmented unison (C–C♯, D–D♭, etc.).

This pedagogical approach enables and encourages students to recognize patterns as they notate these chords, and helps sensitize them to musical patterns in general. The instructor should make these patterns explicit before asking the students to do the worksheets so that students can be aware of them as they work. There are a number of patterns that may be pointed out:

1. All white-note major keys have a corresponding black-note sharp or flat key, while C major has both a flat and sharp corresponding key:
   - Flat keys: C♭ major, D♭ major, E♭ major, G♭ major, A♭ major, B♭ major (note that there is a flat-note key for every black note)
   - Sharp keys: C♯ major and F♯ major.

2. All white-note minor keys have a corresponding black-note sharp or flat key, while A minor has both a flat and sharp corresponding key:
   - Sharp keys: c♯ minor, d♯ minor, f♯ minor, g♯ minor, a♯ minor (note that there is a sharp-note key for every black note);
   - Flat keys: e♭ minor; a♭ minor, and b♭ minor.

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[4] One interesting post is the following from The Ohio State University, which condenses and summarizes the findings of a highly technical article, co-authored by one of their faculty members: Ohio State University, "This is your brain detecting patterns: It is different from other kinds of learning, study shows." ScienceDaily. www.sciencedaily.com/releases/2018/05/180531114642.htm (accessed June 10, 2021). The complete article is Arkady Konovalov, Ian Krajbich, "Neurocomputational Dynamics of Sequence Learning," *Neuron*, 2018; DOI: 10.1016/j.neuron.2018.05.013

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3. When transposing a chord in a white-note key to its corresponding black-note key (transposing up or down an augmented unison), one can think of the chords as positive/negative images of one another: the ii chord in C major is d–f–a, so the ii chord in C♯ major will be d♯–f♯–a♯, and so on. When transposing up an augmented unison, white notes become sharps, and flats become white notes; when transposing down an augmented unison, sharps become white notes, and white notes become flats. My students have found this approach to be very helpful.
4. When moving up the scale from C–D, D–E, E–F, etc., all notes are transposed up by the same amount, either a M2 or a m2. Therefore, the ii chord in C major, d–f–a, becomes e–g–b as the ii chord in D major, etc.
5. Once a student has spelled the ii chord correctly, adding the tonic note above the 5th creates the minor 7th necessary for the ii^7.

At this point, it would be valuable to ask students what other patterns they can discover, to further encourage them to engages in this important activity. While having them look at the first examples on pp. 4 and 5 of their handout, the instructor may wish to guide students to discover these two additional patterns:

1. Having spelled the ii^7 correctly, eliminating the root creates the IV chord.
2. The M7 of the IV chord is the note a m2 below the root of the IV^7 chord.

To give the students an opportunity to figure this out on their own before seeing the answers, these two answers appear upside down on the student handout and worksheet that follows.

Spelling Subdominant-Function Triads and Seventh Chords in Major and Minor Keys Utilizing a Patterned Approach: Student Handout and Worksheet

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Diatonic chords that have a subdominant function (also called a predominant function) play an important role in tonal music and tonal chord progressions. They precede the dominant chord and provide impetus to move to the dominant. This is a result of their containing two pitches that surround the dominant note: $\hat{4}$ and $\hat{6}$ (*fa* and *la*, or *le* in minor), with $\hat{4}$ usually being in the bass and $\hat{6}$ usually being in an upper voice. This explains why the ii chord is typically found in first inversion—that puts the subdominant note, $\hat{4}$, in the bass. One might conceive of these notes as analogous to upper and lower leading tones—they converge on the dominant from opposite directions.

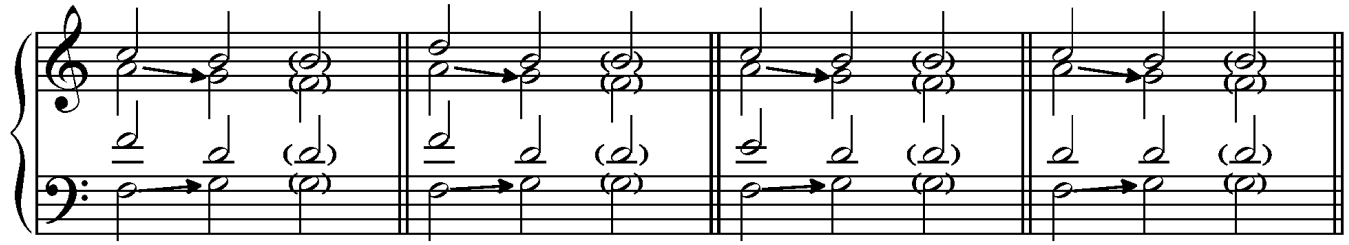
The two diatonic triads that contain $\hat{4}$ and $\hat{6}$ are the subdominant and supertonic chords:

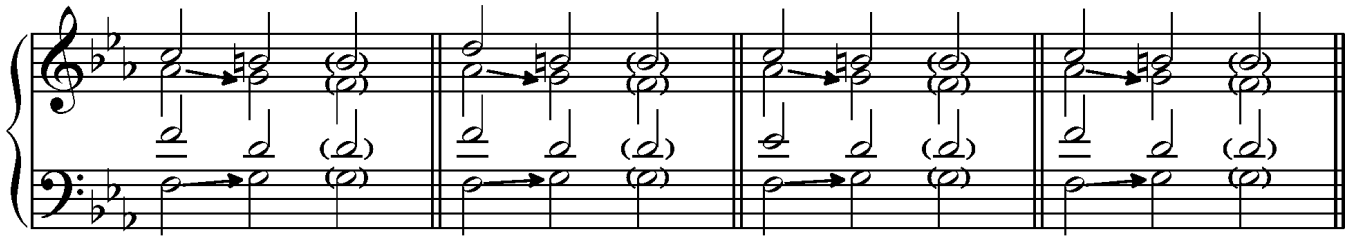
1. In major keys: IV ($\hat{4}$–↑$\hat{6}$–$\hat{1}$, *fa–la–do*) and ii ($\hat{2}$–$\hat{4}$–↑$\hat{6}$, *re–fa–la*)[1]
2. In minor keys: iv ($\hat{4}$–♭$\hat{6}$/↓$\hat{6}$–$\hat{1}$, *fa–le–do*) and ii° ($\hat{2}$–$\hat{4}$–♭$\hat{6}$/↓$\hat{6}$, *re–fa–le*)

Each of these chords exists as a seventh chord as well. All diatonic subdominant-function seventh chords contain $\hat{4}$, $\hat{6}$ and $\hat{1}$:

1. In major keys: IV^7 ($\hat{4}$–↑$\hat{6}$–$\hat{1}$–$\hat{3}$, *fa–la–do-mi*) and ii^7 ($\hat{2}$–$\hat{4}$–↑$\hat{6}$–$\hat{1}$, *re–fa–la–do*)
2. In minor keys: iv^7 ($\hat{4}$–♭$\hat{6}$/↓$\hat{6}$–$\hat{1}$–$\hat{3}$, *fa–le–do-me*) and ii^{ø7} ($\hat{2}$–$\hat{4}$–♭$\hat{6}$/↓$\hat{6}$–$\hat{1}$, *re–fa–le–do*)

While this worksheet does not require any part writing, I have included several examples below to show typical part writing of these chords. The arrows in the examples below illustrate how, when these chords are written in four voices, $\hat{4}$ in the bass moves up to $\hat{5}$, and $\hat{6}$ in an upper voice moves down to $\hat{5}$. These chords can progress to either V or V^7:





[1] In this handout, ↑$\hat{6}$ denotes the major 6th scale degree, e.g., A♮ in C major, and ♭$\hat{6}$/↓$\hat{6}$ denotes the minor 6th scale degree, e.g., A♭ in the key of c minor. $\hat{6}$ without an arrow refers to the 6th scale degree in general without specifically referring to a major or minor key.

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All of these diatonic subdominant-function chords have chromaticized versions as well. Learning to spell the diatonic subdominant-function chords, and understanding how they function, will be of significant help to you when you learn their chromaticized versions later.

The attached worksheets offer a systematic pattern-based approach to spelling diatonic subdominant-function triads and seventh chords in all major and minor keys. It is important to develop your ability to recognize patterns—music is full of patterns! Pattern recognition ability has been shown to be an important predictor of success in Music Theory courses.

The exercises are laid out on two or three staves (as necessary to accommodate the keys). The uppermost staves contain the white-note keys (C major, D major, etc.; c minor, d minor, etc.). The lower staves contain the flat and sharp keys, underneath their corresponding white-note keys.

Here are some helpful things to be aware of:

1. All white-note major keys have a corresponding black-note sharp or flat key, while C major has both a flat and sharp corresponding key:
   - Flat keys: C♭ major, D♭ major, E♭ major, G♭ major, A♭ major, B♭ major (note that there is a flat-note key for every black note)
   - Sharp keys: C♯ major and F♯ major.

2. All white-note minor keys have a corresponding black-note sharp or flat key, while A minor has both a flat and sharp corresponding key:
   - Sharp keys: c♯ minor, d♯ minor, f♯ minor, g♯ minor, a♯ minor (note that there is a sharp-note key for every black note);
   - Flat keys: e♭ minor; a♭ minor, and b♭ minor.

Here are several patterns to be aware of, and these will help you spell the chords correctly:

1. When transposing a chord in a white-note key to its corresponding black-note key (transposing up or down an augmented unison), you can think of the chords as positive/negative images of one another: the ii chord in C major is d–f–a, so the ii chord in C♯ major will be d♯–f♯–a♯, and so on. When transposing up an augmented unison, white notes become sharps, and flats become white notes; when transposing down an augmented unison, sharps become white notes, and white notes become flats.
2. When moving up the scale from C–D, D–E, E–F, etc., all notes are transposed up by the same amount, either a M2 or a m2. Therefore, the ii chord in C major, d–f–a, becomes e–g–b as the ii chord in D major.

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There are additional helpful visual patterns you may discover as you look at the first examples on pp. 4 and 5. For example:

- Once you have spelled the ii chord correctly, adding the tonic note above the 5th creates the minor 7th necessary for the ii^7.

See if you can find two more visual patterns. Your instructor can help guide you. The answers appear below, upside down!

1. Having spelled the ii^7 correctly, eliminating the root creates the IV chord.
2. The M7 of the IV chord is the note a m2 below the root of the IV^7 chord.

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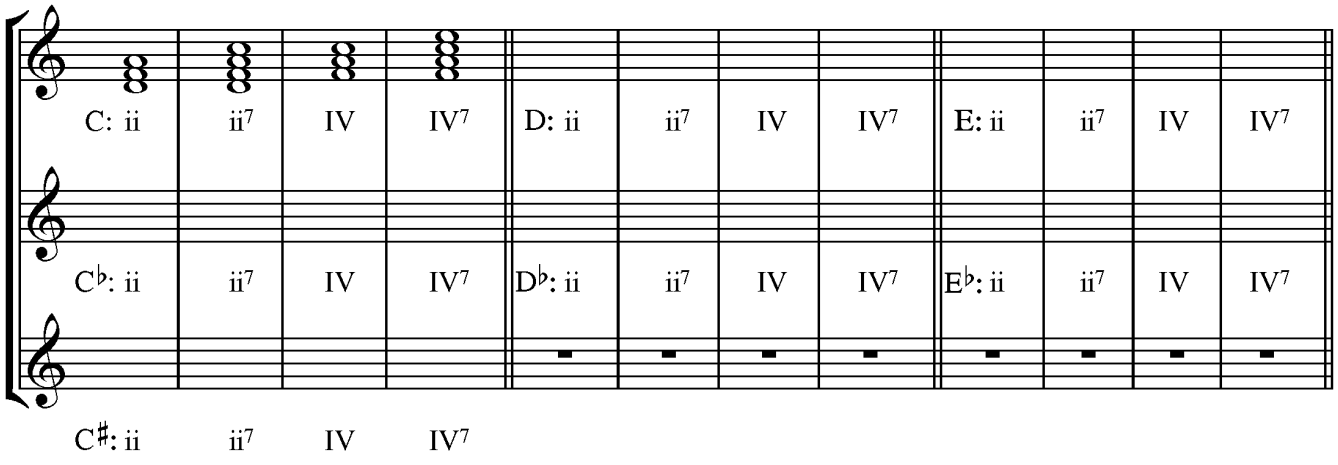
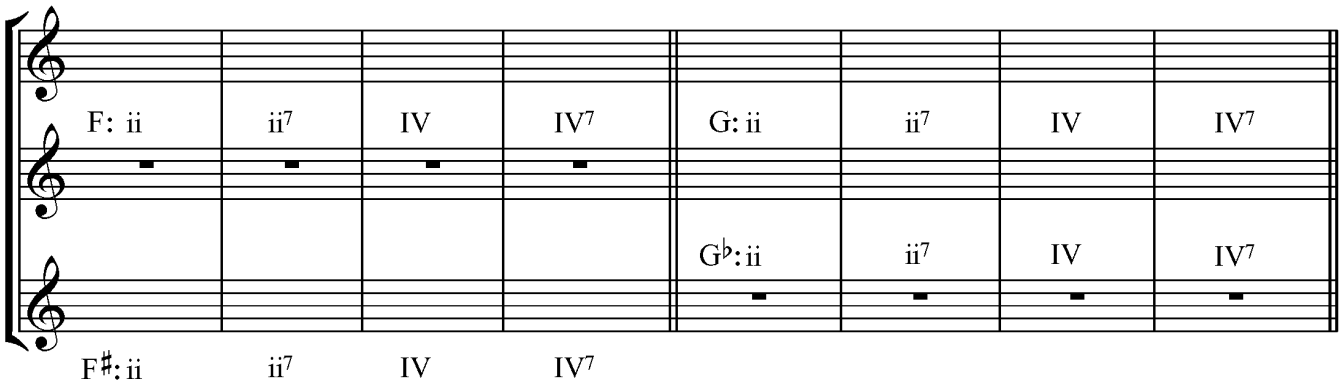
Notate the given chords in root position, including all necessary accidentals. Do *not* use key signatures. Be sure to think about the scale degrees and syllables in each key as you build the chords. Measures with rests in them do not require any notation.

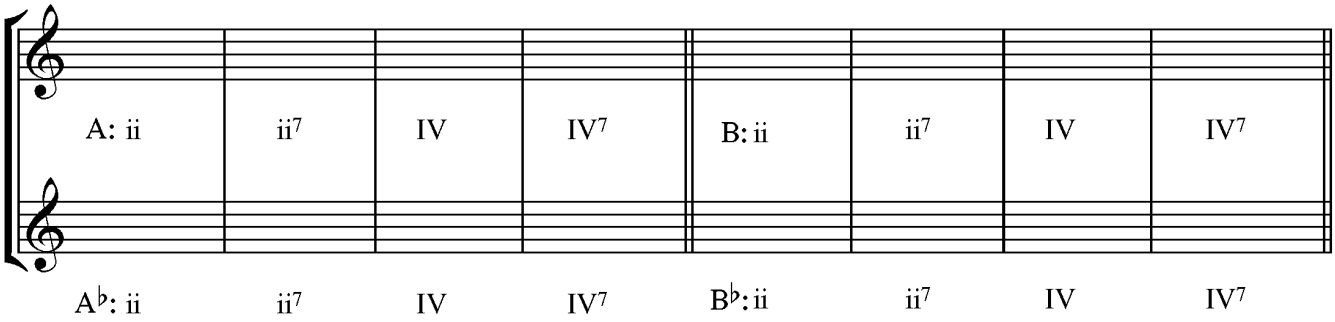
1. Major keys:

ii = $\hat{2}$ $\hat{4}$ $\hat{6}$ (*re fa la*) ii^7 = $\hat{2}$ $\hat{4}$ $\hat{6}$ $\hat{1}$ (*re fa la do*)

IV = $\hat{4}$ $\hat{6}$ $\hat{1}$ (*fa la do*) IV^7 = $\hat{4}$ $\hat{6}$ $\hat{1}$ $\hat{3}$ (*fa la do mi*)







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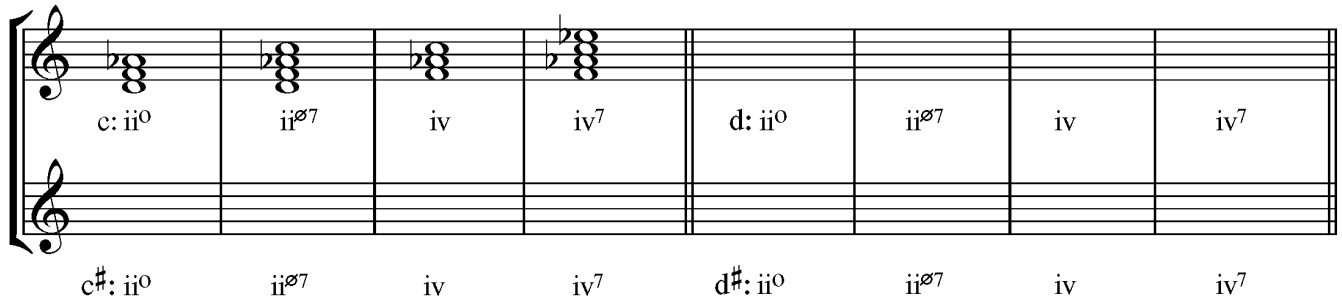
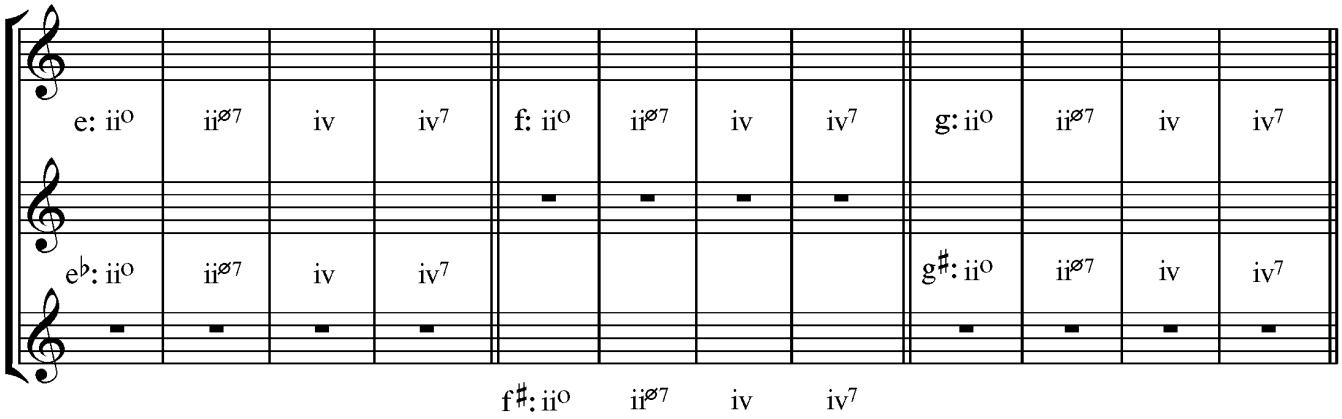
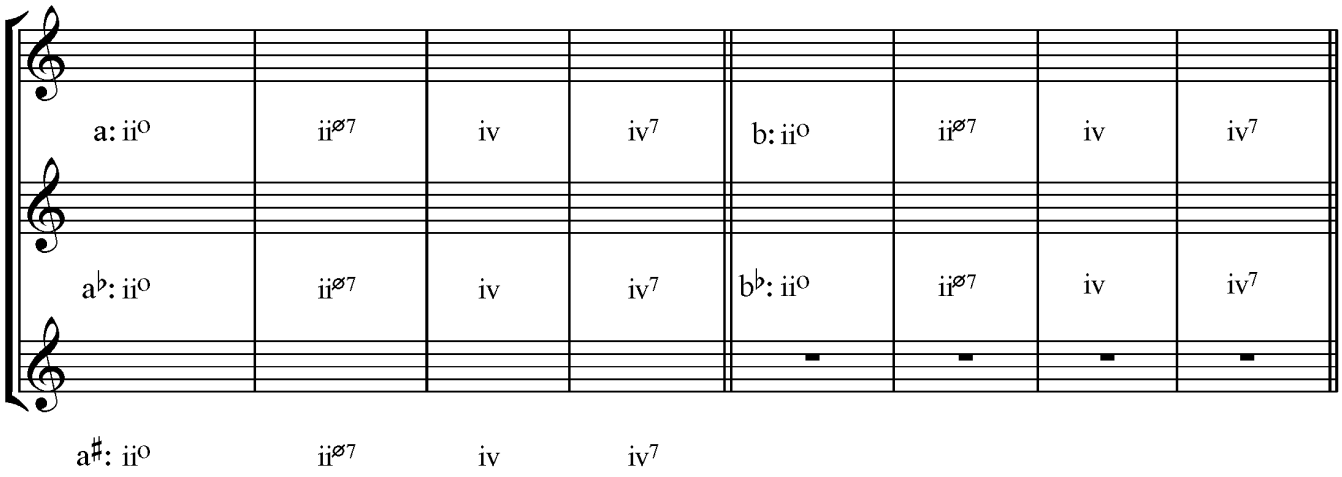
2. Minor Keys: make sure you use the minor 6th scale degree (*le*, ♭6̂/↓6̂) when building the supertonic and subdominant triads and 7th chords. It is the use of that scale degree that creates a diminished triad on the supertonic, a minor triad on the subdominant, a half-diminished 7th on the supertonic, and a minor 7th on the subdominant (and those are the most frequently used chord qualities for supertonic and subdominant chords in minor keys). Measures with rests in them do not require any notation.

ii° = 2̂ 4̂ ♭6̂/↓6̂ (*re fa le*) ii^{ø7} = 2̂ 4̂ ♭6̂/↓6̂ 1̂ (*re fa le do*)

iv = 4̂ ♭6̂/↓6̂ 1̂ (*fa le do*) iv^{7} = 4̂ ♭6̂/↓6̂ 1̂ 3̂ (*fa le do me*)







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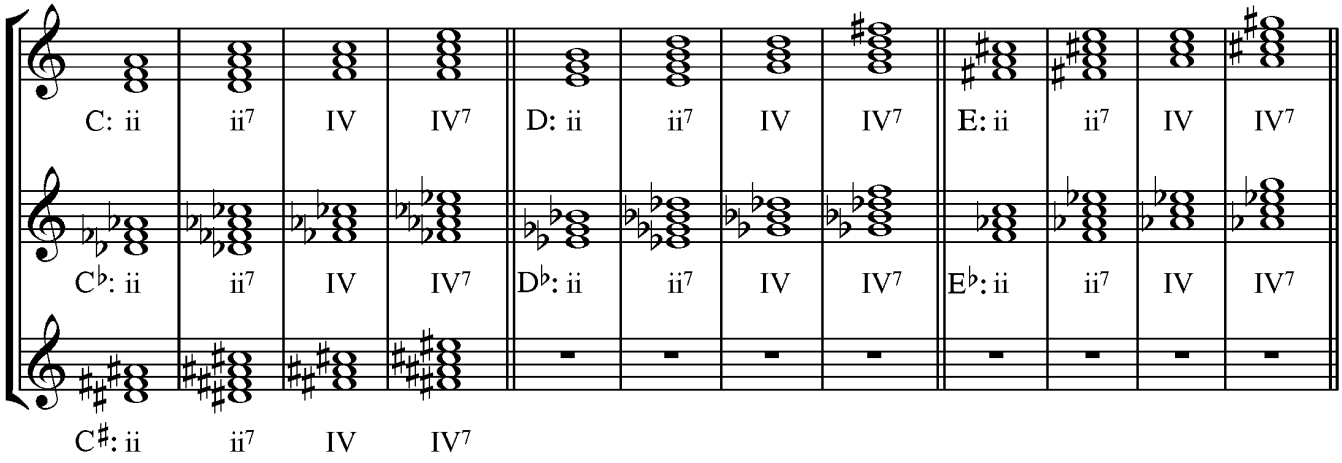
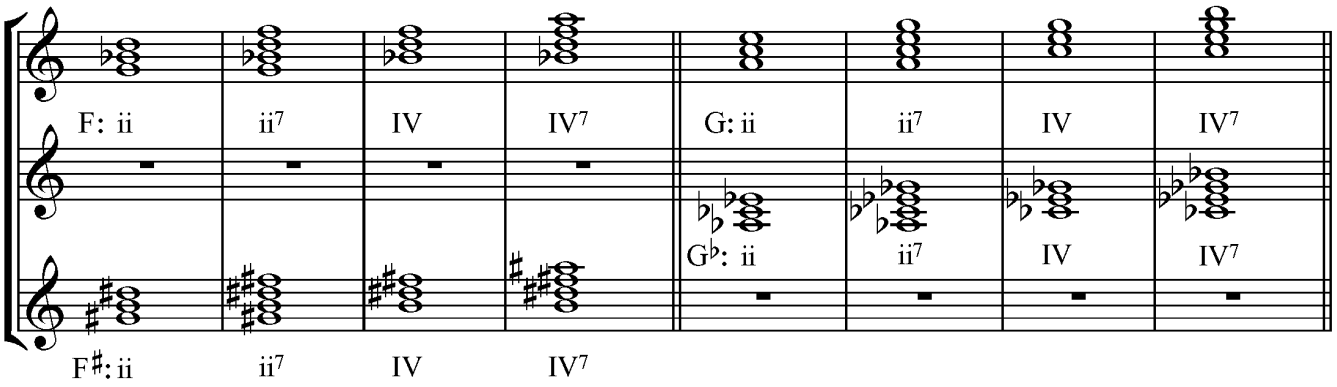
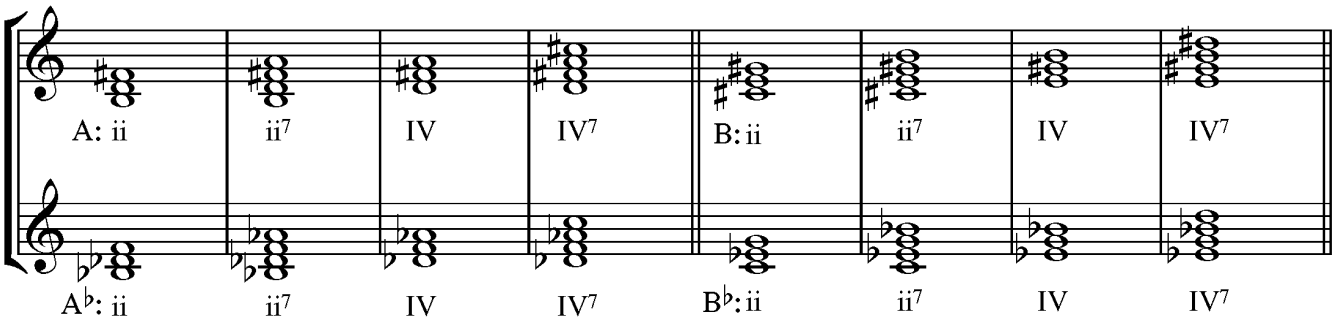
Answer key

1. Major keys:







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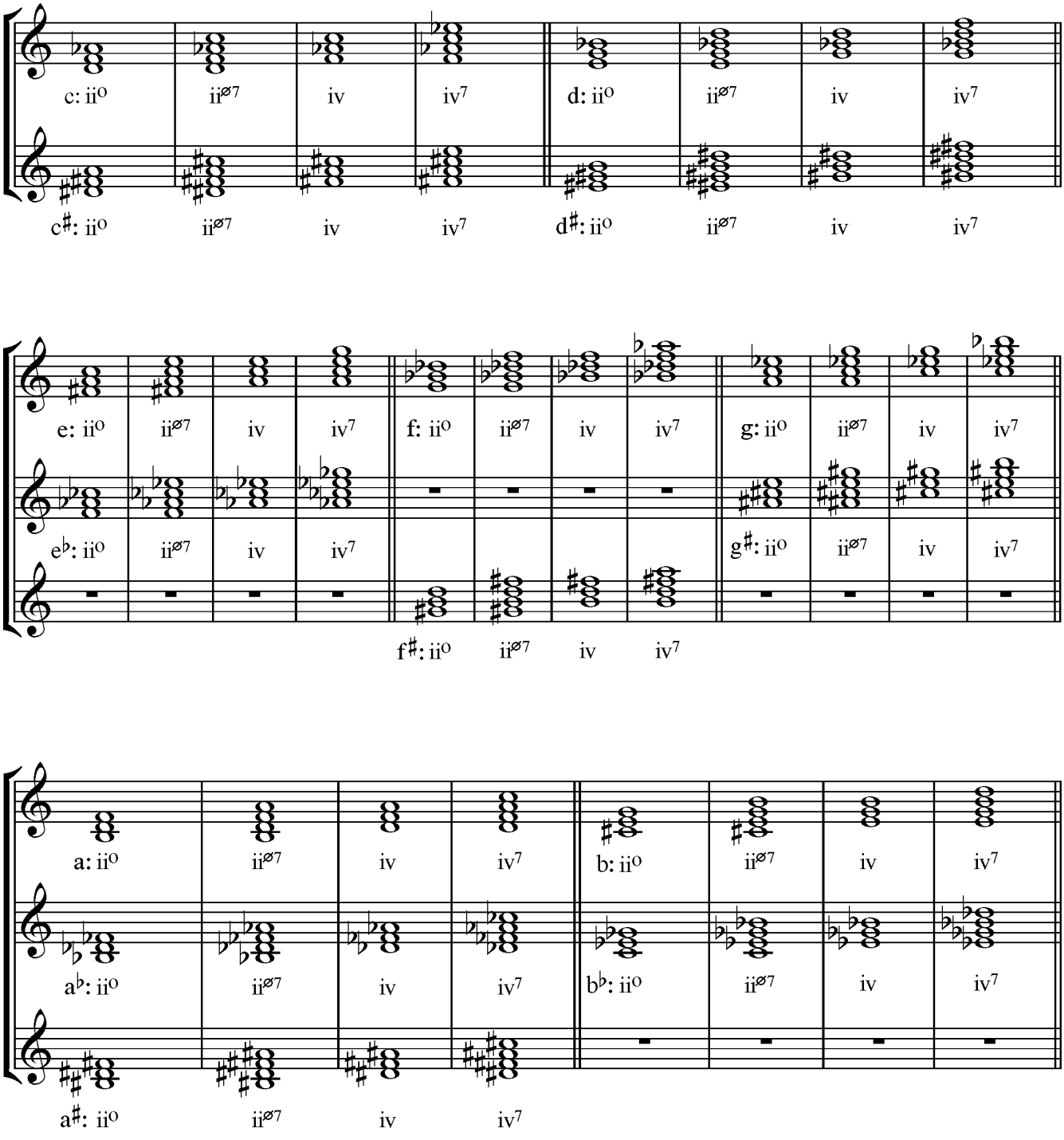
2. Minor Keys:



Spelling Subdominant-Function Triads and Seventh Chords in Major and Minor Keys Utilizing a Patterned Approach: Student Handout and Worksheet

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Abstract

This discussion and worksheet is appropriate for high school AP students, liberal arts college non-music-majors, music minors, or music majors.

This handout and worksheet offers a systematic pattern-based approach to spelling subdominant-function triads and seventh chords. Students are asked to notate these chords in primarily the white-note major and minor keys (some of the most frequently encountered keys). These exercises are laid out so that the keys progress up by step, through the white notes, beginning with C major or c minor, so that students transpose each chord up either a whole step or a half step. This pedagogical approach allows students to recognize a pattern as they notate these chords, and helps sensitize them to musical patterns in general. Pattern recognition ability has been shown to be an important predictor of success in Music Theory courses.

Some basic information is included regarding Nancy Rogers' and Jane Clendinning's testing of the correlation between pattern recognition and success in Music Theory classes. I have found approaching topics in a way that utilizes and reinforces patterns to be a helpful approach.