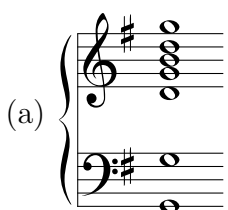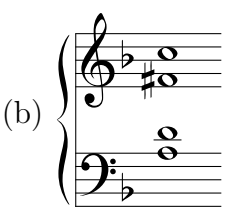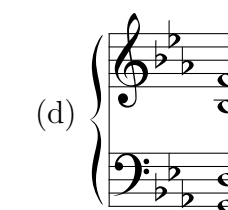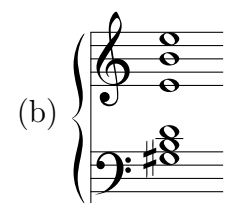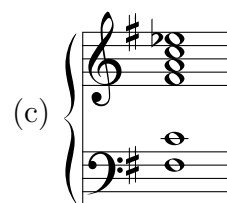# Homework 3

Math 109 / Music 109A, Fall 2022
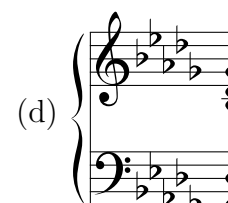
Due Monday, October 17.

NOTE: For problems 6-10, express all decimal approximations in this assignment rounded off to three digits to the right of the decimal.

1. Identify these chords by root note and suffix (e.g., Gm^7 or $B^\flat$ aug). In the case of augmented or diminished seventh chords, take the root to be the lowest note.

(a)   (b)   (c)   (d)

2. Identify these chords by root scale note and suffix (e.g., III^7 or $\sharp IV\, m$) relative to the indicated mode. Again, in the case of augmented or diminished seventh chords, take the root to be the lowest note.

(a)   (b)   (c)   (d)

major   minor   major   Lydian

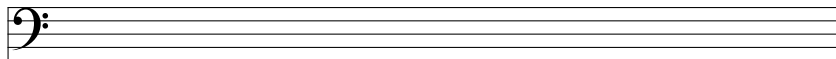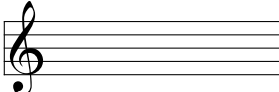3. Write these chords with correct spelling on the <u>bass</u> clef below.
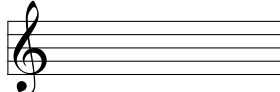
    (a) $E^\flat m^7$ (b) D dim   (c) $G^\flat$ (d) $C^{\sharp 7}$

4. Write these chords with correct spelling on the given clef, using the indicated key signature and mode.

    (a) $\flat III^7$ in the key of C major

    (b) IVm^7 in the key of $B^\flat$ minor

    (c) I aug in the key of A Myxolydian

    (d) $\flat VII$ in the key of $A^\flat$ Dorian

5. Name the chord given by each of these sequence of semitones:

    (a) 4,5

    (b) 2,4,3

    (c) 6,3,6

    (d) 7,8,7

    (e) 8,16,27

6. Name the chord given by each of these sequence of intervals:

   (a) fifth, fourth, major third, tritone

   (b) major third, minor sixth, major sixth

   (c) fifth, octave, minor third, tritone

   (d) step, fifth, major sixth

   (e) minor third, minor third, step

7. Express each of these intervals as ratio, i.e., as elements of $\mathbb{R}^+$, three ways: (1) as a power of 2, (2) as a radical or the reciprocal of a radical, and (3) by a decimal approximation.

   (a) up 47 cents

   (b) down 325 cents

   (c) up a minor sixth

   (d) the interval from G_3 to $A_1^\sharp$

8. Assuming A_4 is tuned to 440 Hz, find the frequencies for:
   (a) C_4 (b) $E_2^\flat$ (c) B_5 (d) $A_3^\flat$

9. Suppose middle C is tuned as 256 Hz. (Note: This is not standard practice.) Find the frequencies for:
   (a) A_4 (b) $F_5^\flat$ (c) C_1 (d) $G_2^\sharp$

10. For each of these chords, voiced within an octave with the root on the bottom, give the pitch of each note in the chord. Assume A_4 is tuned to 440 Hz.

(a) major triad with root G_3

(b) minor triad with root $A_4^\flat$

(c) minor seventh chord with root D_3

(d) diminished seventh with root $B_5^\flat$