Math 105, Spring 2017

Collected Homework Assignment #1 – Pythagorean Tuning
Due Date: Monday, February 6

Please <u>show all necessary work</u>, and <u>write your answers on a separate sheet(s) of paper</u>. As stated in the class policies, I will not grade your assignment if it is not reasonably neat, legible and organized.

For each of the following problems, assume we wish to create a tuning system using 384 Hz as our "base."

1. Following the similar example worked out in class, find the frequencies we'd use for the notes of the "pentatonic scale" (as defined in class) ranging from 384 Hz up to 768 Hz.
(Hint: You should end up with six frequencies, **in order**: 384 Hz at the "bottom," then four others which you'll need to find, then 768 Hz at the "top.")

2. Following the example in class (and in the online notes), use Pythagorean tuning to assign a frequency to each of the twelve notes of the twelve-tone scale, letting C = 384 Hz (base pitch) and C' = 768 Hz:
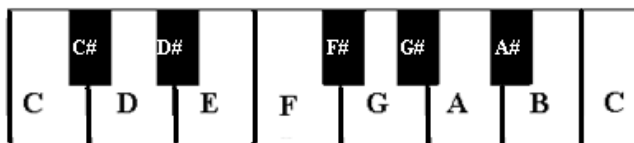
For each note, show and/or explain what computations you used to get your answer, give an *exact* answer (as a *fraction*), and *also* write your answer rounded to the nearest hundredth of a Hertz. Show all of the necessary steps. You may use the Pythagorean tuning diagram developed in class (with all of the frequency ratios worked out) to *check* your answers, but I want to see the actual work of raising/lowering by perfect fifths, etc., for each of the twelve notes of the Pythagorean scale.

3. Following up on #2: Although they aren't included in the Pythagorean scale, find the frequency of each of the following: L6, L7 and R7. (Where L or R followed by a number indicates we've lowered or raised the base frequency by that number of fifths, as described in class.) Why do you suppose the Pythagoreans did not elect to include these notes in their scale? Please write your thoughts on this (at least two sentences).