Tempered Tuning Explained

1. Sounds (pitches) are simply vibrations of air moving from a source to our ear. There is NO sound in outer space that we can naturally hear.
2. Pitches are labeled as notes A-G only.
3. Interval = distance between two pitches.
4. The distance (interval) between any two successive notes with the same name is called an octave since there is a total of eight notes between them (ex: A, b, c, d, e, f, g, A, b, c, d, e, f, g, A, etc.). A good example of an octave would be if a man and woman sang the same pitch, but within their comfortable voice ranges.
5. Pathagoras, the Greek mathematician, discovered that the natural vibration ratio of any octave is 2:1, in terms of vibrations; he also discovered that the ratio of any fifth (C to G, for example), is 3:2. Since these ratios are relatively simple, they are called PERFECT intervals.
6. On a typical keyboard, there is a total of eight C's or octaves. Moving from the first C at 32 vibrations/sec. to the next octave would be 64 vibrations/sec. (a 2:1 ratio or x2). Therefore, the LAST C on the keyboard is vibrating at 4,096 vibrations per second.
7. If we move through a series of perfect fifths from the first C at 32 vibrations/sec., we will eventually arrive on the same LAST C on the keyboard. However, if we apply multiples of a 3:2 ratio in this process (x1.5), the LAST C on the piano will be approximately 4152 vibrations/sec.

8. CONCLUSION: the laws of nature and physics MUST be modified, by re-tuning a perfect fifth interval differently so that the concluding numbers are identical. Thus, we are technically playing out of tune with Mother Nature.