**Influence of temperament on mathematical properties of a musical scale** JULIA OSEKA, Saint Joseph's University — This paper focuses on investigating the mathematical properties of a musical scale tuned in Pythagorean tuning and 12-TET temperament. The experimental analysis was conducted using measurement of perfect fifths: G3(196Hz)-D4(293Hz), D4(293Hz)-A4(440Hz), and A4(440Hz)-E5(657Hz) played on piano (tuned in 12-TET) and violin (tuned in Pythagorean tuning). The recordings were then studied using the Fast Fourier Transform spectral analysis method, based on the, previously derived, Fourier Series and Fourier Transform. The spectral representation of a complex sound uses the property of Fourier Transform, in which the value of a transform $F(n)$ provides the magnitude of a frequency n and its phase. If the criteria for $f(x)$, being a real-valued function are met, then the transform function $F(n)$ is the complex conjugate of $F(-n)$. In such case, the amplitude of such function can be described as $|F(n)|$. The program uses this property to determine the energy density in the input sound. This method of investigation is simple and has many limitations, however, the differences in the spectra of each of the composite fifths played in two different temperaments showed significant difference in scale's mathematical and physical properties.

Julia Oseka
Saint Joseph's University

Electronic form version 1.4