EECE.5200 - Homework 6

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Accessing Source Code

Source code is available at: https://github.com/tjkessler/eece5200/tree/main/hw6

Note: due to processor architecture incompatibilities (M1 ARM-based processor from Apple), the GLFW-based runtime found in the ***2020_glfw.d*** directory was unable to be compiled. The GLUT-based runtime found in the ***2020_glad.d*** directory will be the primary focus for this assignment.

Methodology

Two files are supplied in the ***2020_glad.d*** directory: *2D.cpp* and *3D.cpp*. These files display a two-dimensional and a three-dimensional sinusoidal waveform respectively. Sinusoidal waves are constrained to $-1 \leq x \leq 1$ and $-1 \leq y \leq 1$ for the two-dimensional representation, and $-1 \leq x \leq 1$, $-1 \leq y \leq 1$, and $-1 \leq z \leq 1$ for the three-dimensional representation. 100 samples of x between -1 and 1 are sampled for the two-dimensional representation, and 20 samples of x and z between -1 and 1 are sampled for the three-dimensional representation. Values of y are calculated using $y = sin(x\pi)$.

The purpose of this assignment is to modify the supplied runtimes such that the sinusoidal waveforms move left and right (w.r.t. the x axis) when the *'l'* and *'r'* keys are pressed respectively, and move up and down (w.r.t. the y axis) when the *'u'* and *'d'* keys are pressed respectively. This was accomplished by introducing two global variables, *_OFFSET_X* and *_SCALAR_Y*. *_OFFSET_X* introduces a horizontal shift to the waveforms, and *_SCALAR_Y* introduces a vertical scale (adjustment of amplitude) to the waveforms. The *glutPostRedisplay()* function is used to update the sinusoidal waveforms' graphical representation.

Results

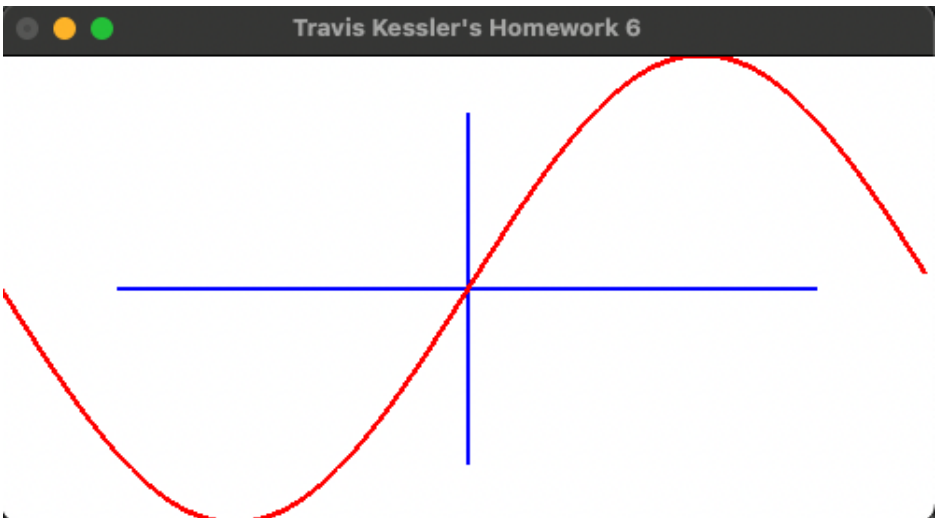

Figure 1: Default positioning for two-dimensional sinusoidal waveform

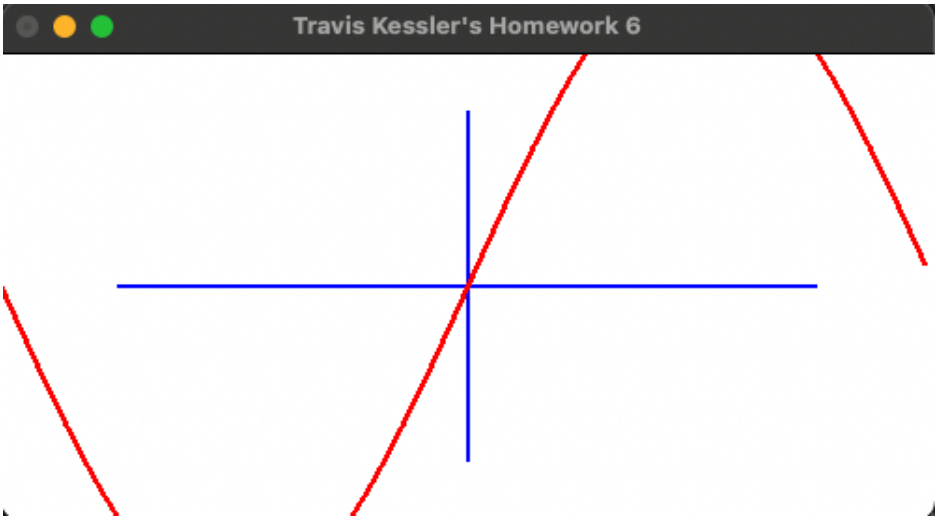

Figure 2: Increased amplitude for two-dimensional sinusoidal waveform

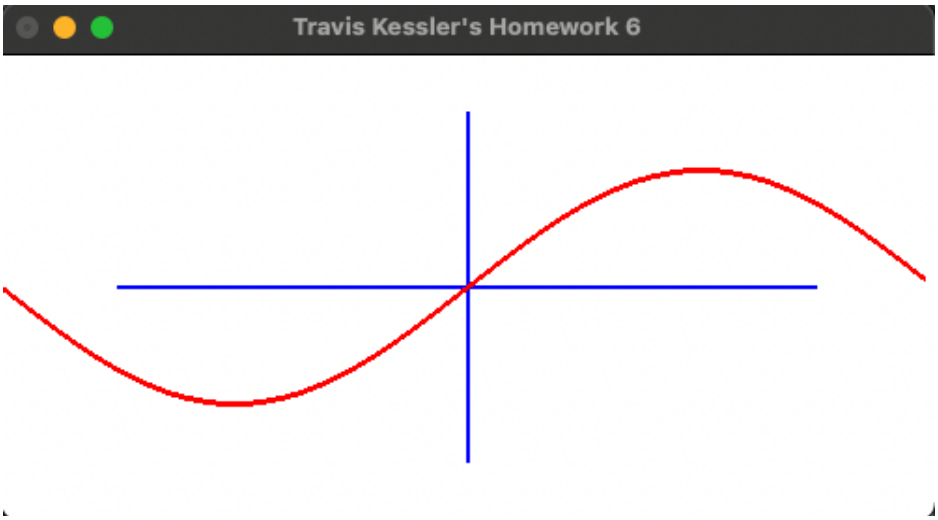

Figure 3: Decreased amplitude for two-dimensional sinusoidal waveform

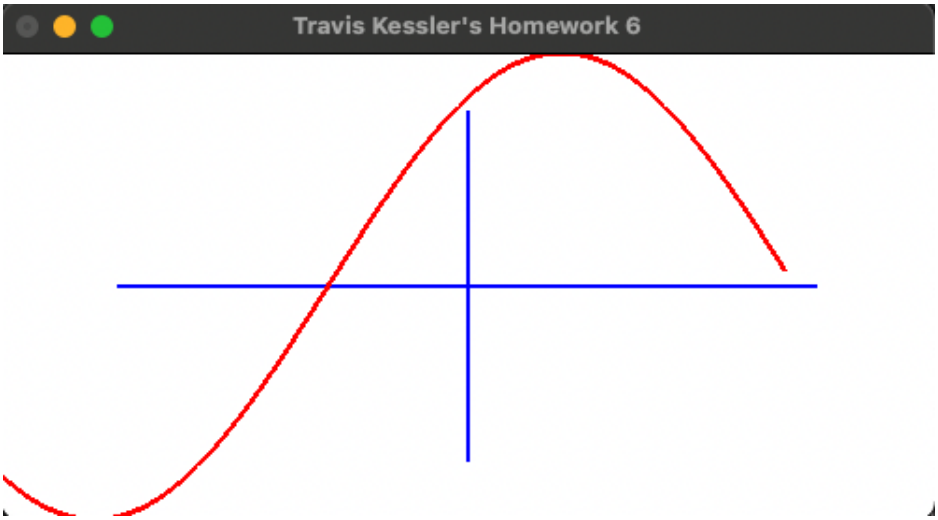

Figure 4: Left-shifted positioning for two-dimensional sinusoidal waveform

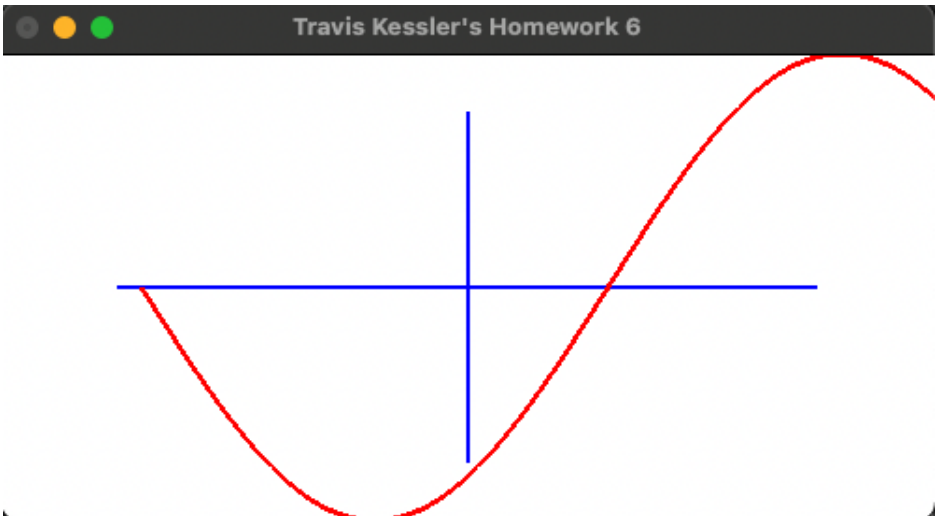

Figure 5: Right-shifted positioning for two-dimensional sinusoidal waveform

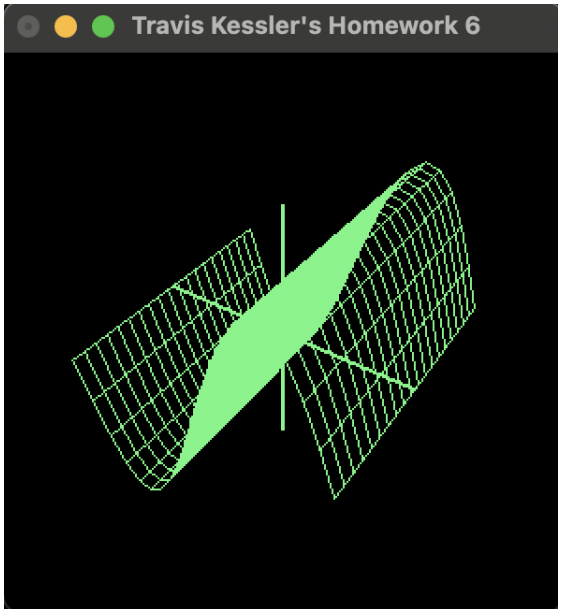

Figure 6: Default positioning for three-dimensional sinusoidal waveform

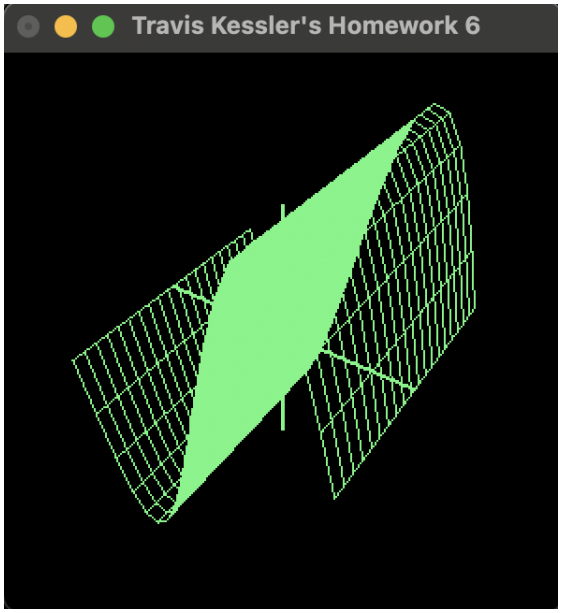

Figure 7: Increased amplitude for three-dimensional sinusoidal waveform

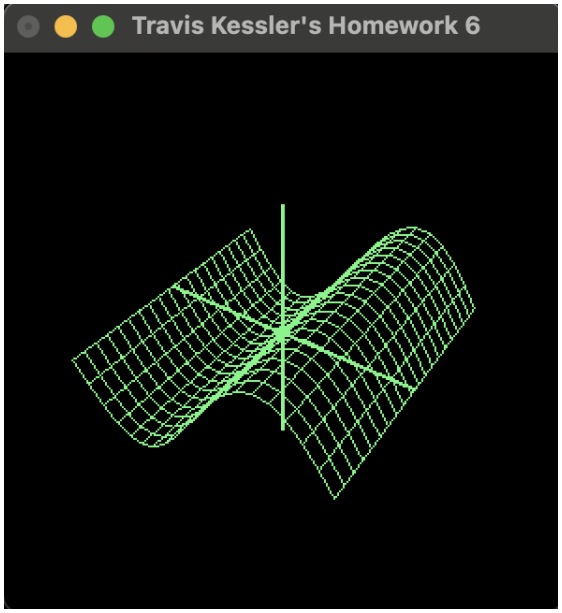

Figure 8: Decreased amplitude for three-dimensional sinusoidal waveform

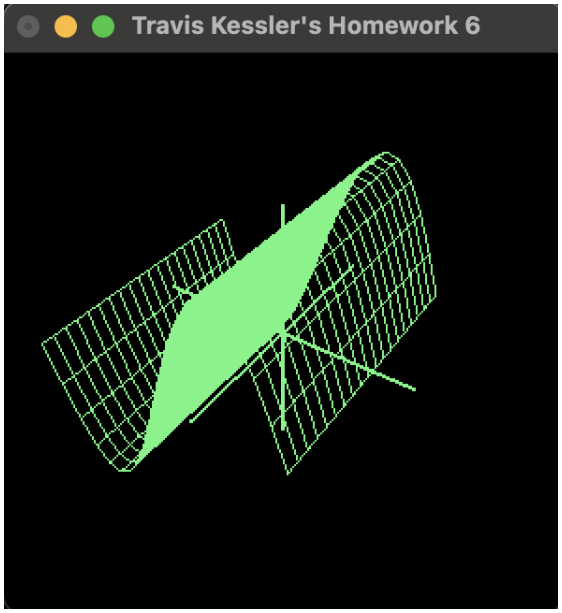

Figure 9: Left-shifted positioning for three-dimensional sinusoidal waveform

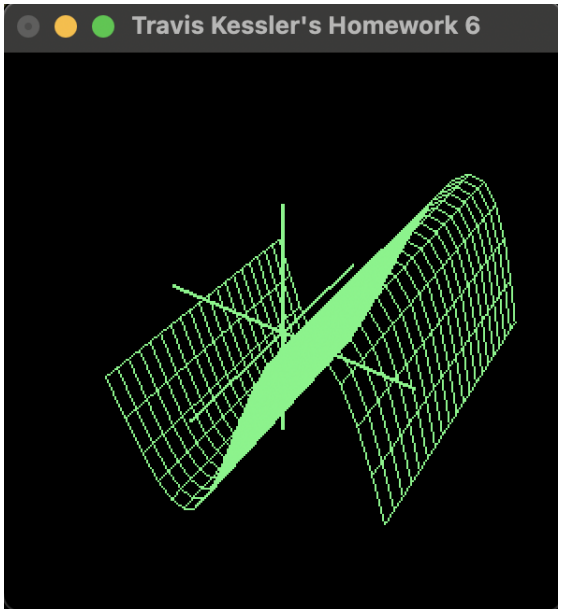

Figure 10: Right-shifted positioning for three-dimensional sinusoidal waveform

Bibliography

[1] Thompson, C. *University of Massachusetts Lowell Department of Electrical and Computer Engineering 16.520 Computer Aided Engineering Analysis Problem Set 6*. Retrieved April 19, 2021, from http://morse.uml.edu/Activities.d/16.520/S2021.d/ps6.pdf