Problem 1

In class, you saw the gamma (γ) function and how it is involved in gamma correction when adjusting for the displayed brightness of a pixel. In the old days, macintosh computers used a gamma of γ = 1.8. Since then, the industry has converged on a standard display gamma of γ = 2.2. For this assignment, we let γ = 2.2. Suppose a rendering program has determined the value of a pixel to have the RGB value (25, 104, 175). What will be the value of the displayed pixel after gamma correction? You must show all work for full credit.

Problem 2

Similar to problem 1, suppose we have a pixel whose displayed RGB value is (190, 240, 33). Assume γ = 2.2. What was the original RGB value of the pixel, as determined by the rendering program? You must show all work for full credit.

Problem 3

In class, 3 coordinate systems were introduced: the Image Coordinate System I(x, y), the OpenGL-Texture Coordinate System T(x, y), and the OpenGL-Viewport Coordinate System V(x, y). For notation purposes, let (x_I, y_I) ∈ I^2 be a point in the Image coordinate system, (x_T, y_T) ∈ T^2 be a point in the Texture coordinate system, and (x_V, y_V) ∈ V^2 be a point in the Viewport Coordinate system.

(A)

We defined functions to transform xy-coordinates from I(x, y) → T(x, y) and I(x, y) → V(x, y). Now you must define the function(s) required to transform the xy-coordinates from T(x_T, y_T) → V(x_V, y_V). In other words, give a formal definition of the functions f : T → V and g : T → V such that

\[
x_V = f(x_T) \\
y_V = g(y_T)
\]

(B)

Give a formal definition of the function(s) required to transform xy-coordinates from V(x_V, y_V) → I(x_I, y_I). In other words, what are the functions f : V → I and g : V → I s.t.

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x_I = f(x_V) \\
y_I = g(y_V)
\]