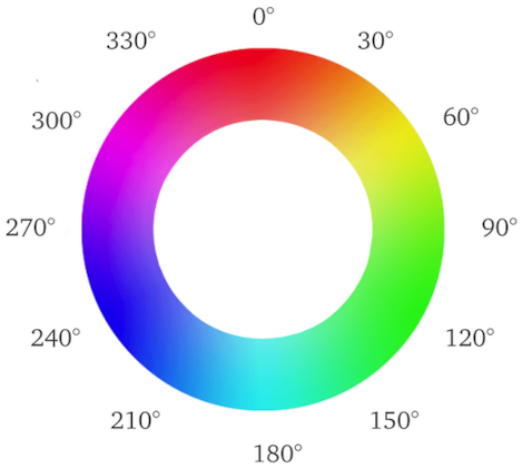
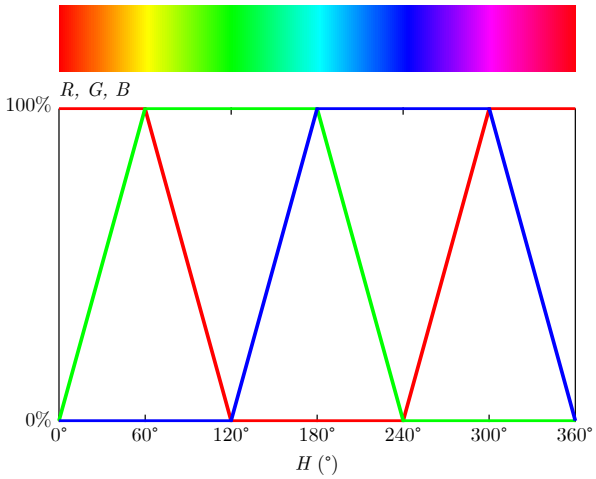
ENGR 3410: Miniproject 2

due October 6, 2025

In this miniproject, you will use the OSS CAD suite to design a digital circuit to drive the RGB LED on your iceBlinkPico board so that it smoothly cycles through the colors around the HSV color wheel (shown below on the left) once per second by driving the individual LEDs using pulse width modulation (PWM) according to the waveforms shown below on the right.



The HSV color wheel.



RGB components versus hue angle, H.

This miniproject is an *individual* one. You can discuss design approaches and help each other with learning SystemVerilog and how to use the OSS CAD suite, but each of you must complete all aspects of this assignment in order to learn how to use the tools. In the process, you should learn several aspects of the processes and software tools that you will be using later in the semester to design more complex digital circuits.

Requirements. Your design must meet the following requirements:

1. Your circuit must repeatedly drive the RGB LED on your iceBlinkPico board with PWM signals to cycle smoothly through the colors around the HSV color wheel once per second (i.e., a 360° cycle takes 1 second) according to the waveforms shown above.

2. Your circuit must be specified in one or more SystemVerilog source files.

3. You must provide a SystemVerilog test bench and simulation results using Icarus Verilog (iverilog) showing at least one complete cycle of your circuit's operation.

Deliverables. By the start of class on October 6, you must submit the following items to the course Canvas site:

1. A PDF file containing a brief report explaining the design of your circuit and its operation. You should include a screen grab of a gtkwave plot showing the simulation of the duty cycle values of the RGB signal components (shown using an analog data format) changing as a function of time in your circuit.

2. Copies of all of the source files specifying your circuit as well as your test bench. You may provide the URL of a Github repo or a shared folder containing your source files.

3. A video demo of your circuit working on your iceBlinkPico board.