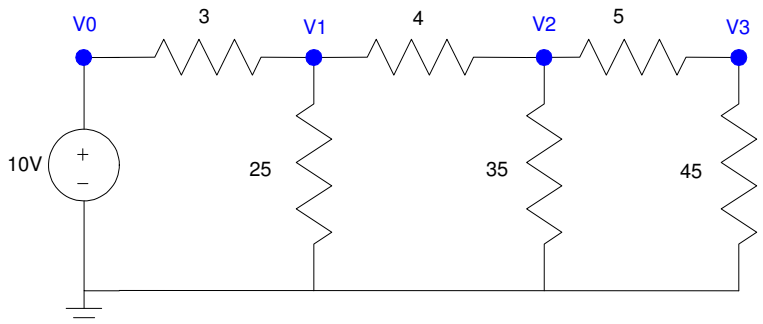
ECE 476/676 - Homework #6

Math, Random, and Matrix Routines - Due Monday, October 13th

Matrix Functions

1) Determine the voltages {V0, V1, V2, V3} using matrix funcitons with Python



a) Write the voltage node equations for this circuit

b) Express these equations in matrix form

c) Solve using matrix operations in Python

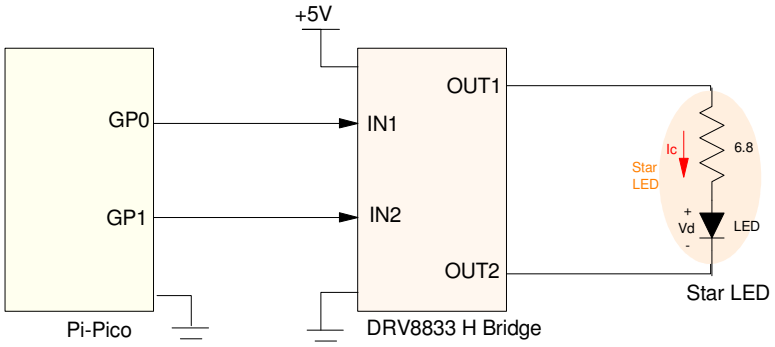
2) Check your answers using CircuitLab (or Matlab)

Candle Flicker (Hardware)

3) Set up a circuit so your Pico can turn a white LED on and off

- H-bridge works (overkill, but works)
- 6144 Transistor works

Verify you can turn the LED on and off with the Pico



4) Flicker (take 1): Make the LED flicker using PWM

- Change the brightness every 100ms
- Make the brightness X% where X has a uniform distrbution from 0% to 100%

Give you opinion for how much this looks like a candle flickering

- kind of subjective

5) Flicker (take 2): Repeat, only

- Change the brightness every Y ms where
- Y has an exponential disribution with a mean of 100ms

Give you opinion for how much this looks like a candle flickering

- kind of subjective

6) Flicker (take 3): Repeat, only

- Change the brightness every 100ms
- Make the brightness X% where
- X has a normal distibution with a mean of 50% and a standard deviation of 20%

Give you opinion for how much this looks like a candle flickering

- kind of subjective

Demonstration

7) Demonstrate what you think is the best flickering candle