EE 109 - Spring 2025

Name: _____

Lab 8 - Hardware Datapath Components

Lab Section ☐ 12:30 W ☐ 2:00 W ☐ 3:30 W ☐ 11:00 F ☐ 12:30 F

TA/Instructor initials: _____

Item	Outcome	Score	Max.
Checkpoint • Width of PWM signal controlled by potentiometer	Yes/No		1
Hardware Operation • LEFT/RIGHT buttons cycle through all three colors	Yes/No		2
• UP/DOWN buttons control the brightness mode	Yes/No		2
• In PWM mode potentiometer controls the LED brightness	Yes/No		2
• Power and ground use short red and black wires	Yes/No		1
• Wiring is done in a neat and orderly fashion	Yes/No		1
Review Questions (graded after submission) • Questions below (put answers in Lab8_Answers.txt file and submit on Vocareum)			3
Code Organization (Graded after submission) • Code is indented properly and includes comments	Yes/No		1
• Program correctly initializes LCD, ADC, Ports, etc.	Yes/No		2
• Program correctly initializes TIMER2	Yes/No		1
• The "`shift_load`" routine is done correctly	Yes/No		3
• The "`shift1bit`" routine is done correctly	Yes/No		2
Total			21
Open ended comments:			

Review Problems

1. (2 points) We would like to add a feature where if the Select button is pressed on the LCD, it turns the LED off completely, and then turns it back on when Select is pressed again. Explain how this could be done without having to make any changes to the wiring of the circuit .

2. (1 point) When TIMER2 is counting, the count value is kept in the TCNT2 register and is constantly being compared for equality (and only equality) to the values in the OCR2A register to determine when to terminate the PWM pulse. Suppose at some point your program adjusts the PWM width by changing the OCR2A register, and the new OCR2A value is lower than the value that is currently in the TCNT2 register. What will happen to the output signal during this pulse period?