|                          | Criteria                                                                                                                                                                                          | Points | Notes                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lab section              |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| Step 1                   |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| Explanation              | 3-5 sentence overview is given where TA asks questions to probe understanding                                                                                                                     | 6      | All or nothing: questions are asked until TA is satisfied with answer and then full points are rewarded                                                       |
| Step 3                   |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| LED blinks               | LED blinks on and off                                                                                                                                                                             | 2      |                                                                                                                                                               |
| Blinking timing          | LED is observed to be on for 1 second, and off for 2 seconds, for at least two cycles by the TA                                                                                                   | 2      |                                                                                                                                                               |
| Implementation           | digitalWrite() and pinMode() are NOT used anywhere in the code                                                                                                                                    | 8      |                                                                                                                                                               |
| Step 4                   |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| External LED             | Same behavior and code style as Step 3, but on the external LED                                                                                                                                   | 3      |                                                                                                                                                               |
| Step 5                   |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| Initialization           | Re-uploading the code displays a 0 on the Serial monitor or displays nothing, and never increments as long as the button is not pressed                                                           | 3      |                                                                                                                                                               |
| Serial monitor increment | one push of the button corresponds to one increment of the value printed to serial monitor; verified by TA for at least 5 button pushes                                                           | 6      | some inconsistency due to debouncing is ok, but<br>MOST button presses should increment the count by 1                                                        |
| Implementation           | digitalRead() and pinMode() are NOT used anywhere in the code                                                                                                                                     | 3      |                                                                                                                                                               |
| Interrupt                | Button press is detected in the EIC_handler and is not polled anywhere                                                                                                                            | 4      |                                                                                                                                                               |
| Step 6                   |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| LED toggles              | pressing either button toggles at least one LED between off and on                                                                                                                                | 2      |                                                                                                                                                               |
| Differentiate LEDs       | pressing the pin 0 button causes at least one action (turn off or turn on) on the on-board LED and pressing the pin 1 button causes at least one action (turn off or turn on) on the external LED | 2      |                                                                                                                                                               |
| Toggle and differentiate | Randomly alternating pushing the pin 0 and pin 1 buttons toggles the corresponding LEDs                                                                                                           | 6      | some inconsistency due to debouncing is OK, but pin<br>0 should never cause a change to external LED and<br>pin 1 should never cause a change to on-board LED |
| Implementation           | pinMode, digitalRead, and digitalWrite are NOT used anywhere in the code                                                                                                                          | 4      |                                                                                                                                                               |
| Interrupt                | Button press is detected in the EIC_handler and is not polled anywhere                                                                                                                            | 7      |                                                                                                                                                               |
|                          |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| Writeup                  |                                                                                                                                                                                                   |        |                                                                                                                                                               |
| Lab code turned in       | Canvas turnin contains zip with two .ino files                                                                                                                                                    | 2      |                                                                                                                                                               |
| Partner name             | Report indicates partner name                                                                                                                                                                     | 1      | "no partner" is sufficient if no partner                                                                                                                      |
| Question 1               | Questions are noted, or "no questions" (or variation) is written                                                                                                                                  | 2      |                                                                                                                                                               |
| Question 2               | Frustrations are noted, or "none" (or variation) is written                                                                                                                                       | 2      |                                                                                                                                                               |
| Question 3               | Main takeaway is noted (in good faith, vacuous such as "I was able to do lab 1" not accepted)                                                                                                     | 2      |                                                                                                                                                               |
| Question 4               | Lists addresses of global variables, local variables, and functions                                                                                                                               | 2      |                                                                                                                                                               |

| Question 4 | Explains differences between where data is stored and how memory used "grows" between global variables, local variables, and functions; referencing addresses in datasheet | 4  |                      |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----------------------|
| Question 4 | Names the type of memory architecture being used, with justification                                                                                                       | 3  | no justification: -2 |
| Question 5 | Writes down values from steps 7c and 7d                                                                                                                                    | 1  |                      |
| Question 5 | Uses understanding of static keyword to explain any differences between values                                                                                             | 2  |                      |
| Question 6 | Notes how long lab took                                                                                                                                                    | 1  |                      |
|            |                                                                                                                                                                            |    |                      |
|            | TOTAL                                                                                                                                                                      | 80 |                      |