Lab 4: Demo Questions (10 points)
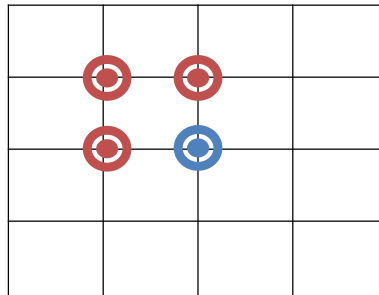**Mondays students:** Due on April 29, 2019 at the beginning of class
Wednesdays students: Due on May 01, 2019 at the beginning of class
Print, answer, and hand it back to T.A.
(NO Dropbox submission!)
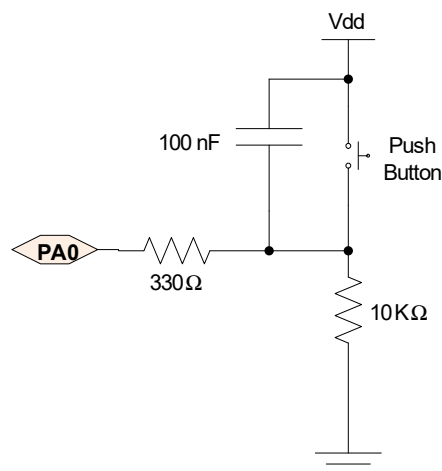
Student Name: SOLUTION

1. **(3 points)** When multiple keys are pressed, can the scan algorithm correctly detect all keys pressed? (Hint: ghosting, or ghost key).

   No. Ghosting key.

   If the three red keys are pressed down, the software will mistakenly think four keys, including the blue key, have been pressed. This problem cannot be solved unless hardware is changed.

2. **(4 points)** The joy stick on the STM32L4 board has a hardware debouncing circuit. The following is one example debouncing circuit. Explain briefly how the hardware debouncing circuit works.

The capacitor filters out high frequency signals.

3. **(3 points)** Debouncing can also be performed by software. Explain what you should do in your program to perform a typical solution for software debouncing.
Note: You don't need to write any code for this. Just explain what a program should do in this case.

The easiest software debouncing technique is wait-and-see. When the program detects that a button is pressed, it re-examines the input signal after a short delay, typically between 20 and 50 ms. If the input signal still shows the button is pressed, the program then report that the button has been pressed indeed.

Grade: _____ out of 10