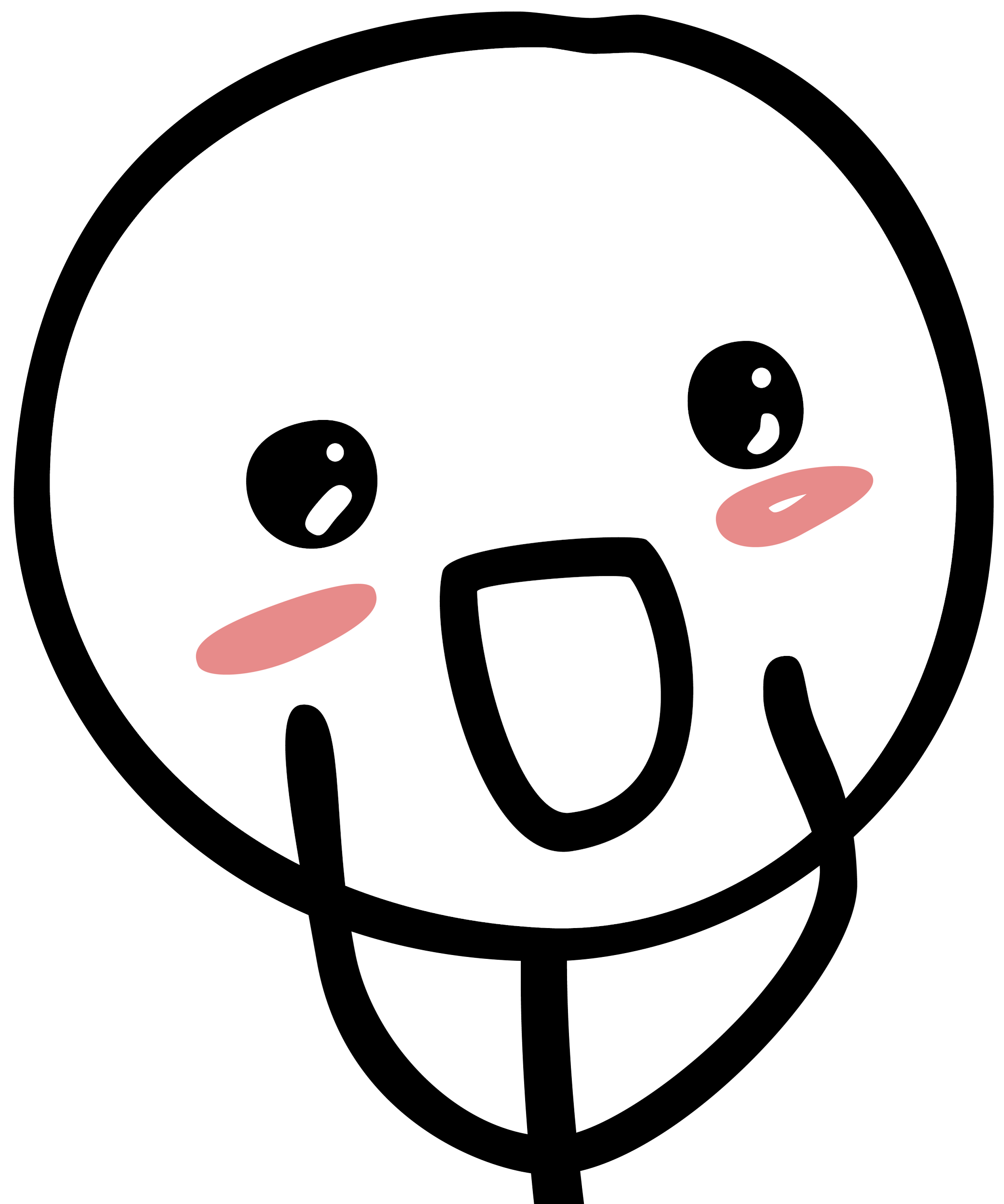
****

**Pre-Lab 4b: Interrupts**

Name: Socheath Sok,

Class: EE 346 L

Section 6, T/Th

Date: October 23, 2018

**Questions:**

1. After reset is applied and before clock is asserted, will the LED be ON or OFF. Explain your answer.

If the conditions are true, reset will be high, which mean that D will be 0 and will be 1. Since the LED is connected to , it will light up.

1. Assuming the current into the D input of the Flip-flop is negligible, what current, if any, would flow through the pull-up resistor wired to the button when the button is pressed?

There is a current running due to the 5V power supply connecting the switch to the LED through the D-flip flop. Assuming that the voltage drop across the LED is around 2.5V,

1. Modify the waveform diagram with inputs D and CLK of the Flip-flop and output Q.
2. Answer the following:
   1. a. Your program has two interrupts enabled in addition to reset: external interrupt request 0 (INT0), and timer/counter 1 overflow interrupt (TIMER 1 OVF). While the program is in the ISR for INT0, the INT0 flag is set. What will happen? Explain.

When INT0 is in the ISR, the pc will return to the starting address, which results in TOIE1 being set. When TOIE1 is overflow, TOV1 will set and pc will point to it’s address of 0x001A.

* 1. If both interrupt flags set at the same time, what program address (the actual number) will be loaded? Hint: see ATmega328P IVT.

The program address will be that of INT0 which is 0x0002A.

* 1. What should be the last instruction in the ISR?

The last instruction to return the address to the start should be RETI.

1. Complete the code.
   1. Initialize INT0 to generate an interrupt when the pin has any logical change:  
      \_\_\_lds\_\_\_ r17, 0x01  
      \_\_\_sts\_\_\_ EICRA, \_\_r17\_\_\_
   2. Enable external interrupt 0:  
      \_\_\_sbi\_\_\_ EIMSK, \_\_INT0\_\_\_
   3. What other instruction is needed to enable INT0?

sei