Aaron Rito
ECE375
Prelab 8

1. In this lab, you will be given a set of behaviors/actions that you need to have a proof-of-concept "toy" perform. Think of a toy you know of (or look around online for a toy) that is likely implemented using a microcontroller, and describe the behaviors it performs. Here is an example behavior: "If you press button X on the toy, it takes action Y (or makes sound Z)":

Remote controlled inflatable robot. It moves forward when a button is pressed. It also can turn on a button press.

2. For each behavior you described in the previous question, explain which microcontroller feature was likely used to implement that behavior, and give a brief code example indicating how that feature should be configured. Make your explanation as ATmega128-specific as possible (e.g., discuss which I/O registers would need to be configured, and if any interrupts will be used), and also mention if any additional mechanical and/or electronic devices are needed.

Interrupts on data receive complete using USART0 bit 7 of UCSR0A , or button interrupts, wireless transmitter, wireless receiver. PWM using T/C overflow.

3. Each ATmega128 USART module has two flags used to indicate its current transmitter state: the Data Register Empty (UDRE) flag and Transmit Complete (TXC) flag. What is the difference between these two flags, and which one always gets set first as the transmitter runs? You will probably need to read about the Data Transmission process in the datasheet (including looking at any relevant USART diagrams) to answer this question.

UDRE is set when the transmit buffer is ready to receive new data.
TXC is set one when the entire frame in the Transmit Shift Register has been shifted out and there are no new data currently present in the transmit buffer.
The UDRE is set first, then the TXC.

4. Each ATmega128 USART module has one flag used to indicate its current receiver state (not including the error flags). For USART1 specifically, what is the name of this flag, and what is the interrupt vector address for the interrupt associated with this flag? This time, you will probably need to read about Data Reception in the datasheet to answer this question.
RXC flag, $003C