

**Question 0:** Stop... Do not proceed until you have read the entire lab in detail. The following questions come from all parts of the lab. Once you have completed this worksheet show it to a TA before starting to work on the rest of the lab. Make sure to read the sample code before meeting with a TA

**Question 1:** Record the period and the min/max duty cycle for each axis of the accelerometer.

X-axis:

Period \_\_\_\_\_ Min Duty-Cycle \_\_\_\_\_ Max Duty-Cycle \_\_\_\_\_

Y-axis:

Period \_\_\_\_\_ Min Duty-Cycle \_\_\_\_\_ Max Duty-Cycle \_\_\_\_\_

How do these values compare to the values/formulas in the accelerometer datasheet?

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**Question 2:** What is the highest positive duty cycle you can obtain on both the x-axis and y-axis of the accelerometer at the same time?

X-axis: \_\_\_\_\_ Y-axis: \_\_\_\_\_

What is the lowest positive duty cycle you can obtain on the x-axis and the y-axis of the accelerometer at the same time?

X-axis: \_\_\_\_\_ Y-axis: \_\_\_\_\_

**Question 3:** How much is the “Duty Cycle Change per g” of the accelerometer? \_\_\_\_\_

**Question 4:** What is the largest Duty Cycle Change you should theoretically see assuming that you ignore noise (see hints)? \_\_\_\_\_

**Question 5:** What is the possible range of values that you can use to adjust the positive duty cycle of a PWM given that we will be using Timer2? Min: \_\_\_\_\_ Max: \_\_\_\_\_

**Question 6:** Given that we want a period of 4 ms for the accelerometer, how many counter increments will occur during the period of your accelerometer (See Question 1) given the following prescalars:

Clk/1            \_\_\_\_\_  
Clk/8            \_\_\_\_\_  
Clk/32           \_\_\_\_\_  
Clk/64           \_\_\_\_\_  
Clk/128          \_\_\_\_\_  
Clk/256          \_\_\_\_\_  
Clk/1024        \_\_\_\_\_

**Question 7:** Given that we want a period of <15 ms for outputting your PWM, how many counter increments will occur during the period of your PWM given the following prescalars:

Clk/1            \_\_\_\_\_  
Clk/8            \_\_\_\_\_  
Clk/64           \_\_\_\_\_  
Clk/256          \_\_\_\_\_  
Clk/1024        \_\_\_\_\_

**Question 8:** If all the interrupts fired at the exact same time, which interrupt should be serviced first in regards to the needs of the lab? (The interrupts are: Timer0 Output Compare, Timer1 Input Capture, External Interrupt 0, ADC)

**Question 9:** If use a have a scale of 0 to X where X is the highest value equaling a 100% duty cycle, derive a formula to produce the Output Compare Value so that the period of <15ms is maintained. Use a prescaler of clk/8.