

Lab 2 - Scopes and Signals

Lab  12:30 W  2:00 W  3:30 W  
 Section  11:00 F  12:30 F

1. (5 points) Fill out the following table for outputs A0 and A1. The duty cycle of a signal is the ratio (expressed as a percentage) of the time the signal is in the high state to the period of the signal.

Bit	Time in 1 state	Time in 0 state	Period	Frequency	Duty cycle
A0	_____	_____	_____	_____	_____
A1	_____	_____	_____	_____	_____

**Checkpoint:** Show a CP your measurements of the two periodic signals to received the bonus point.

2. (2 points) What is the range of the width of the A2 pulse that you observed?

Narrowest: \_\_\_\_\_ Widest: \_\_\_\_\_

3. (2 points) What is the approximate time delay from the input to the output of the NOT gate?

4. (5 points) Fill in the table below with the input voltages to the 74HCT04 inverter and the resulting output voltage.

Input voltage	Output voltage
0.0	
0.2	
0.4	
0.6	
0.8	
1.0	
1.1	
1.2	
1.3	
1.4	
1.5	

Input voltage	Output voltage
1.6	
1.7	
1.8	
2.0	
2.2	
2.4	
2.6	
2.8	
3.0	
4.0	
5.0	

## Review Problems

1. (3 points) Suppose you wanted to measure the frequency of a note played by a piano and sensed from a microphone connected/viewed on an oscilloscope. Answer the following True/False questions with a brief explanation.
  - a. True/False: To measure the frequency, the vertical scale of the oscilloscope would be of more use than the horizontal scale.
  
  - b. True/False: Since the note is played for a short time period, we should set the triggering to “Single” rather than “Run”.
  
  - c. True/False: If the signal ranges between 0V and 2.5V, the trigger level should ideally be set around 1.25V.
  
2. (2 points) Each scope probe has a short black ground wire attached to it. Why is it necessary to connect this to the circuit’s ground point in order to make a measurement?
  
  
  
  
  
  
  
  
  
  
3. (1 point) If you have used the Horizontal Position control to move the trigger point horizontally so much that you can no longer see the trigger point on the screen, what is the quick way to restore the trigger point back to the middle of the screen?