Your Name
Introduction to Oscilloscope
Date Completed

PRELAB

MATLAB

Matrix and Vector Subscripts

Given the matrix $M = \begin{bmatrix} 16 & 2 & 3 & 13 \\ 5 & 11 & 10 & 8 \\ 9 & 7 & 6 & 12 \\ 4 & 14 & 15 & 1 \end{bmatrix}$, evaluate the following vectors and matrices:

1. **a = M(1,3)**

2. **b = M(2,4)**

3. **c = M(:,1)**

4. **d = M(4,:)**

5. **E = M(1:2,3:4)**

Creating a Range

Using the MATLAB **help** command, write the syntax and give a description of the following commands:

6. **linspace**

7. **logspace**

8. **Compare and contrast the colon operator and the linspace command.**

9. **If you needed a variable with 100 elements, with the first element equal to 0 and an increment of 0.5, which command would you use (colon operator or linspace)? What would be the syntax?**

10. **Create the same range of variables in Question 9, except use the command you did not choose in that problem.**

SCREEN MEASUREMENTS

MEASURING AMPLITUDE

11. Look at the bottom left of the screen. What is the scale factor for channel 1? Using the scale factor, determine the peak to peak voltage displayed on the oscilloscope. Does this value match that of the arbitrary/function generator?

12. Change the input impedance to 50 Ω. Does the amplitude displayed on the screen match that of the arbitrary/function generator?

MEASURING FREQUENCY AND PERIOD

13. Looking at the screen, what is the time division for the signal on channel 1? Using the time division, calculate the frequency of the signal. Does the frequency match that of the arbitrary/function generator?

14. Using the time division, calculate the period of the signal.

CURSOR MEASUREMENTS

MEASURING AMPLITUDE

15. According to the cursor measurements, what is the peak to peak voltage of the signal?

MEASURING FREQUENCY AND PERIOD

16. According to the cursor measurements, what is the frequency of the signal? What is the period?

AUTOMATIC MEASUREMENTS

17. Record the values "Pk – Pk" (peak to peak), "RMS", "Frequency" and "Period" in Table 1. Do the measurements match the settings of the arbitrary/function generator?

Pk – Pk (V)	
RMS (V)	
Frequency (Hz)	
Period (sec)	

Table 1. Automatic Measurements

TRIGGER

18. Using the TRIGGER controls on the oscilloscope, adjust the trigger level up and down. How does this effect the signal displayed?

19. What happens when the trigger level is outside of the signal (above or below the signal)?

20. Select MENU from the TRIGGER controls. From the menu, select "Slope." How does toggling from positive to negative edge triggering affect the signal displayed?

INTENSITY: THE Z AXIS

21. Adjust the intensity until some parts of the signal are dimmer. What part of the signal is brightest? What does this tell you about that part of the signal?

CAPTURING DATA

SAVING AS A GRAPHIC FILE
22. Save the current signal as a TIFF file and paste it below.

COMMA DELIMITED FILE
23. What would be the MATLAB code to read and plot the data from a comma delimited file created by the oscilloscope?

DATA FILE
24. Save the signal as a data file, load into MATLAB, plot the signal, and paste an image of the MATLAB plot below.

FLOATING OUTPUTS

25. What is the voltage across R_1? Is this what was expected? Explain.

26. What is the voltage across R_2? Is this what was expected? Explain.

27. What is the voltage across R_2? Is this what you expected? Explain.