

## **ENGR 104 Exam 3**

### **Part I Calculations (show the derivation/process for credit)**

1. Convert the following binary numbers to decimal: 100101.101 **(10 points)**
2. Convert the decimal number to binary: 101.11 (keep two digits after the binary point) **(10 points)**
3. Convert the hex number to binary and then to octal: FEDAC.DA **(10 points)**
4. Calculate  $11101 \times 1111$  and  $110101 / 101$  (Keep two digits after the binary point). **(20 points)**

Name \_\_\_\_\_

### Part II Use Matlab to solve the problems

1. A vector is given by:  $V = [-5, 2, -4, 1; 0, -1, -1, 20; 50, 9, 9, 10]$ . Design a **user-defined function** and using a 'for loop' to kick out the elements that are larger than 10 and save the new vector in V2. **(15 points)**

2. Use a 'for loop' to compute and plot the following function over the interval  $-2\pi \leq x \leq 2\pi$ :

$$\text{for } x < -\pi, \quad g(x) = \sin(x)+2$$

$$\text{for } x \geq -\pi \text{ and } x \leq \pi, \quad g(x) = 2$$

$$\text{for } x > \pi, \quad g(x) = \sin(x)-2$$

Plot  $g$  versus  $x$  for  $x$  from  $-2\pi$  to  $+2\pi$  ( $x$  on the horizontal axis,  $g$  on the vertical). All the three functions should be plotted in one diagram (one waveform).

Use at least 100 points in your  $x$  vector so you get a smooth curve. Label your graph. **(15 points)**.

3. Write a **user-defined function** to calculate the mean value and the maximum value of the following vector. Write another function to count how many '0's the vector has. **(send the functions to the email separately)**.

$x = [0, 103, 0, 105, 104, 0, 99, 100, 0, 102, 0, 107, 105]$

Your script should call that function to do this job. **(20 points)**