Problem Set 5

Use Matlab to calculate the answers to the following:

Problem 1

Write a user defined Matlab function that determines the angle that forms by the intersection of two lines. For the function name and arguments, use $th = anglines(A, B, C)$. The input arguments to the function are vectors with the coordinates of the A, B, and C, as shown in the figure, which can be 2 or 3-dimensional. The output th is the angle in degrees. Use the function and lines for determining the angle for the following cases:
a) A(-5,-1,6), B(2.5,1.5,-3.5), C(-2.3,8,1)
b) A(-5.5, 0),B(3.5,-6.5),C(0,7)

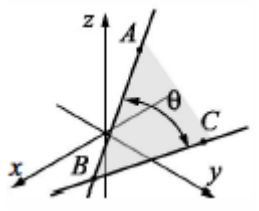

Figure 1:

Problem 2

Write a user defined Matlab function that determines the unit vector and the direction for the line that connects two point (A and B) in space. For the function name and arguments, use n = *unitvect(A,B)*. The input to the function are two vectors A and B, each with Cartesian coordinateS of the corresponding point. The output is a vector with the components of the vector in the direction from A to B. If points A and B have 2 coordinate each (they are in the x-y plane), then n is a two element vector. If points A and B have three coordinates each (general points in space), then n is a three-dimensional vector. Use the function to determine the following unit vectors:
(a) In the direction from point (1.2, 3.5) to point (12, 15)
(b) In the direction from point (-10, -4, 2.5) to point (-13, 6, -5)

Problem 3

Write a user defined Matlab function that converts integers written in decimal form to binary form. Name the function $b = Bina(d)$, where the input argument d is the integer to be converted and the output argument b is a vector with ones and zeros that represents the number in binary form. The largest number that could be converted with the function should be a binary number which 16 ones. If a large number is entered as d, the function should display an error message. Use the function to convert the following numbers:
(a) 100
(b) 1002
(c) 52601
(c) 200,090

Problem 4

In polar coordinates a two-dimensional vector is given by its radius and angle (r, θ). Write a user defined function that adds two vectors that are given in polar coordinates. For the function name and arguments, use $[r, th] = AddVecPol(r1, th1, r2, th2)$, where the input arguments are (r_1, θ_1) and (r_2, θ_2) , and the output arguments are the radius and angle of the results. Use the function to carry out the following additions:
(a) $r_1 = (5, 23°)$, $r_2 = (12, 40°)$
(b) $r_1 = (6, 80°)$, $r_2 = (15, 125°)$

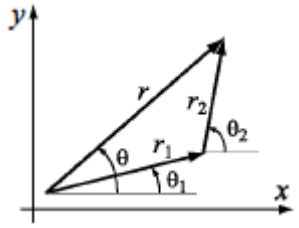

Figure 2: