ENED 1091: Homework #4
Due: Week 3 at beginning of Recitation

Problem 1: Arithmetic Operations with Arrays

Determine whether or not the following matrix operations are allowable or not. If the operation is not allowable, indicate this. Otherwise, provide the result. Do these by hand.

(a) $\begin{bmatrix} 4 & 8 & -1 \\ 2 & A & 3 \end{bmatrix} + \begin{bmatrix} 5 & -2 & 6 \\ B & 7 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 4 & 8 & -1 \\ 2 & A & 3 \end{bmatrix} - \begin{bmatrix} 5 & -2 & 6 \\ B & 7 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 \\ -2 \end{bmatrix} \times \begin{bmatrix} 4 & 5 & 3 \end{bmatrix}$

(d) $\begin{bmatrix} 5 \\ -3 \\ 0 \end{bmatrix} \times \begin{bmatrix} -2 \\ 6 \\ 0 \end{bmatrix}$

(e) $\begin{bmatrix} -2 & 0 \\ 3 & 5 \end{bmatrix} \times \begin{bmatrix} 4 & 0 & A \\ 5 & -3 & B \end{bmatrix}$

(a) Allowable

9	6	5
2+B	7+A	4

(b) Allowable

-1	10	-7
2-B	A-7	2

(b) Allowable

4	5	3
-8	-10	-6

(d)Not allowable

(e)Allowable

-8	0	-2*A
37	-15	3*A+5*B

Problem 2: Solving Systems of Linear Equations using Matrices

Write each of the following systems of equations in matrix form: Ax = b. Then determine whether or not each of the following systems of linear equations has a unique solution. If there is a unique solution, find it. Include all MATLAB commands.

(a) $r + 2s + 3t = 1$
$-2r + 6s + 2t = -1$
$10s + 8t = 3$

What is the Matrix Equation? Write it out in the form Ax = b.
Ans:Yes, it is.

A:			**x:**	**b:**
1	**2**	**3**	**r**	**1**
-2	**6**	**2**	**s**	**-1**
0	**10**	**8**	**t**	**3**

What is the determinant of the matrix?
Ans: The determinant of the matrix is 0.
If there is a unique solution, then solve for r, s, and t.
No solution

(b) $q - r + 2s + 3t = 1$
$-2q + 4r + 6s + 2t = -1$
$7q - 3r + 4s + 4t = 2$
$3q - 5s + 10t = 2$

What is the Matrix Equation? Write it out in the form Ax = b.
Ans: Yes, it is.

A:				**x:**	**b:**
1	**-1**	**2**	**3**	**q**	**1**
-2	**4**	**6**	**2**	**r**	**-1**
7	**-3**	**4**	**4**	**s**	**2**
3	**0**	**-5**	**10**	**t**	**2**

What is the determinant of the matrix?
Ans: -1056
If there is a unique solution, then solve for q, r, s, and t.
Ans: q = 0.0085
r = -0.3627
s = 0.0104
t = 0.2027

Problem 3: Find the equation of a parabola that opens to the left and passes through the points: (–15, 2), (1, 4), and (3, 5). Show all of your work and MATLAB commands.

Work: $\mathbf{x = -2y^2 + 20y - 47}$

```
>> a = [4, 2, 1; 16, 4, 1; 25, 5, 1];
>> b = [-15; 1; 3];
>> c = inv(a)*b;
>> disp(c)
   -2.0000
   20.0000
```