

**Engr 123**  
**Assignment 05**  
**Vector Operations in a Static Class**

**February 14, 2018**  
**Due: February 28, 2018**

Reminder: This is a programming project, and work on this assignment should be done individually. Assistance from other students is limited to questions about specific issues as noted in the syllabus.

MATLAB<sup>®</sup> is a programming language which operates on arrays. For this problem we will develop a set of functions which will allow MATLAB<sup>®</sup> like operations in C#. Table 1 shows the MATLAB<sup>®</sup> function and explains what each does. It also gives a sample calling statement for a similar function in C#.

Write each function along with a main program that illustrates what each function does. All of your functions must be located in a static class called MLV (Matlab Vector). Each function must be static and public so that it can be called from the main program without creating an instance of the class.

Turn in a zipped project file. Name your zipped file Asn05XXX.zip where XXX are your three initials. Upload your zipped project file to <\\cecsfp01\users\everyone\Engr123>

**Table 1**

Table of functions similar to those available in MATLAB.

<b>MATLAB<sup>®</sup></b>	<b>Operation</b>	<b>C# Function Header and Comments</b>
$a = x.*y$	Does a term by term multiplication of the array $x$ times the array $y$ . If $x$ is not the same size as $y$ it returns an error.	bool MLV.Mult(int []x, int []y, int [] a) Returns true if the operation is successful - otherwise false. $a[i] = x[i] * y[i]$
$a = x.^n$	Raises each term in $x$ to the power $n$ . $x$ is an array and $n$ is an integer.	bool MLV.Power(int []x, int [] a, int n) Returns true if the operation is successful - otherwise false. $a[i] = \text{Math.Pow}(x[i], n)$
$a = x./y$	Does a term by term division of the array $x$ by the array $y$ . If $x$ is not the same size as $y$ it returns an error.	bool MLV.Div(int []x, int []y, int []a); Returns true if the operation is successful - otherwise false. $a[i] = x[i] / y[i]$
$a = x*n$	Multiplies each term in $x$ by $n$ . $n$ may be an integer or a double.	bool MLV.Mult(int []x, int []a, int n) Returns true if the operation is successful - otherwise false. $a[i] = x[i] * n$
$a = x/n$	Divides each term in $x$ by $n$ . $n$ may be an integer or a double.	bool MLV.Div(int []x, int []a, int n) Returns true if the operation is successful - otherwise false. $a[i] = x[i] / n$
sum(x)	Returns the sum of the items in vector $x$ .	int MLV.Sum(int [] x) Returns the integer sum of the elements in $x$ . If this function fails it returns a zero and posts a note to the screen.
diff(x)	creates a vector which has the differences in $x$ . ( $x[i] - x[i - 1]$ ). If $x$ is of size $n$ the difference vector will be of size $n-1$	bool MLF.Diff(int []x, int []d) Returns true if the operation is successful - otherwise false. $a[i] = x[i] - x[i-1]$
average(x)	Returns the average of the items in the vector $x$ .	double MLV.Avg(int [] x) Returns the average value of the elements in $x$ . If this function fails it returns a zero and posts a note to the screen.
median(x)	Returns the median of the items in vector $x$ .	int MLV.Med(int [] x) Returns the median of the elements in $x$ . If this function fails it returns a zero and posts a note to the screen.
max(x)	Returns the maximum value in the vector $x$ .	int MLV.Max(int [] x) Returns the maximum of the elements in $x$ . If this function fails it returns a zero and posts a note to the screen.
min(x)	Returns the minimum value in the vector $x$ .	int MLV.Min(int [] x) Returns the minimum of the elements in $x$ . If this function fails it returns a zero and posts a note to the screen.