

**ENGR 0011 – Fall 2018**  
**HW 5**

Acceptable behaviors for this assignment include:

- Consulting your textbook or other written material
- Asking your team members
- Asking your professor or TA

Note that consulting materials and asking others is only acceptable as long as they do not provide you with the solutions – you have to come to the solution on your own!

Unacceptable behaviors for this assignment include:

- Copying the solution(s) from a solution manual, book, other written material, or from other students
- Copying the solutions(s) from assignments submitted in previous semesters
- Providing the solutions to a classmate, student in other section, student in future section, or online solution banks
- Asking someone to complete the assignment for you

**Sheet 1:** Name Sheet 1 “Part 1” and follow the instructions below.

For the dataset shown below, enter this data into Excel. Using trendlines, determine which of the following functions better fits the data (you should use  $r^2$  value to determine) linear, exponential, or power function. Be sure to show the equation and  $r^2$  value of the best fit line. Remember that both the exponential and power functions require that data values less than or equal to zero be filtered because the log of a nonpositive number is undefined.

After identifying the best fit line, add a section on the same sheet to solve the equations on page E-120 of the text book using linear algebra. Convert the linear equations into matrices of the form  $Ax = b$ , and show what the values are of each matrix. After doing so solve for  $x$ .

Your solution should produce the same values for  $a$  and  $b$  that are displayed by Excel in the trendline equation. Make sure to clearly show the value of matrices  $A$ ,  $A^{-1}$ ,  $b$ , and the values of  $a$  and  $b$ .

<b>x</b>	<b>Dataset</b>
0.00	0.00
0.50	0.90
1.00	3.00
1.50	6.00
2.00	10.40
3.00	20.00
4.00	40.00
5.00	55.00
6.00	65.00
7.00	100.00
8.00	120.00
9.00	160.00
10.00	190.00

**Sheet 2:** Name Sheet 2 “Part 2” and follow the instructions below.

Represent the following set of linear equations using matrix notation and solve.

$$5a - 6b + c = 8$$

$$11a + b = 5$$

$$a + 2b - 6c = 3$$

Make sure that your sheet looks something like this:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2																	
3		$5a - 6b + c = 8$															
4		$11a + b = 5$															
5		$a + 2b - 6c = 3$															
6																	
7																	
8			A =					$A^{-1} =$					$A * A^{-1} =$				
9																	
10																	
11																	
12																	
13			b =					$A^{-1} * b =$									
14																	
15																	
16																	

**Sheet 3:** Name Sheet 3 “Part 3” and follow the instructions below.

If you add the age of six people, Alice, Barb, Carol, Dean, Eric, and Fred, the total is 92. Alice is twice the age of Carol. The total age of Barb and Eric equals that of Fred. The total age of Alice and Carol equals the total age of Barb and Fred. Carol is 8 years younger than Fred. If you subtract the age of Eric and Carol from Dean the result is 10. What is the age of each person?

- Set up the set of linear equations that show the relationships among all of the unknowns.
- Convert the linear equations into matrices of the form  $Ax = b$ , and show what the values are of each matrix.
- Solve for  $x$ .

Make sure that your sheet is set up similarly to Sheet 2. Also make sure to indicate clearly the age of each person.

**Sheet 4:** Name Sheet 4 “Part 4” and follow the instructions below.

There were four products (D, E, F, and G) produced from a chemical process. The following relationships were determined for the products. The amount of Product D produced was found to be twice the amount of product E. The amount of product F was twice the sum of products D and E. The sum of all products was 10. There was the same of product D and G.

- Set up the set of linear equations that show the relationships among all of the products.
- Convert the above linear equations into matrices of the form  $Ax = b$ , and show what the values are of each matrix.
- Solve for  $x$ .

Make sure that your sheet is set up similarly to Sheet 2. Also make sure to indicate clearly the amount of each product.

**This is a team assignment.** Upload the Excel file through your class computer using the official file submission link (found on the desktop of class computers in GSCC 138 or BEH 229 at the beginning of the class when this assignment is due). The file should be named Assign-5-TeamName (e.g. Assign-5-L03).