Math 11 Matrix Calculations

Introduction

We are going to use Microsoft Excel to solve systems of equations.

We will use the following formulas:
- **mdeterm** – calculate matrix determinant
- **minverse** – calculate matrix inverse
- **mmult** – multiply matrices
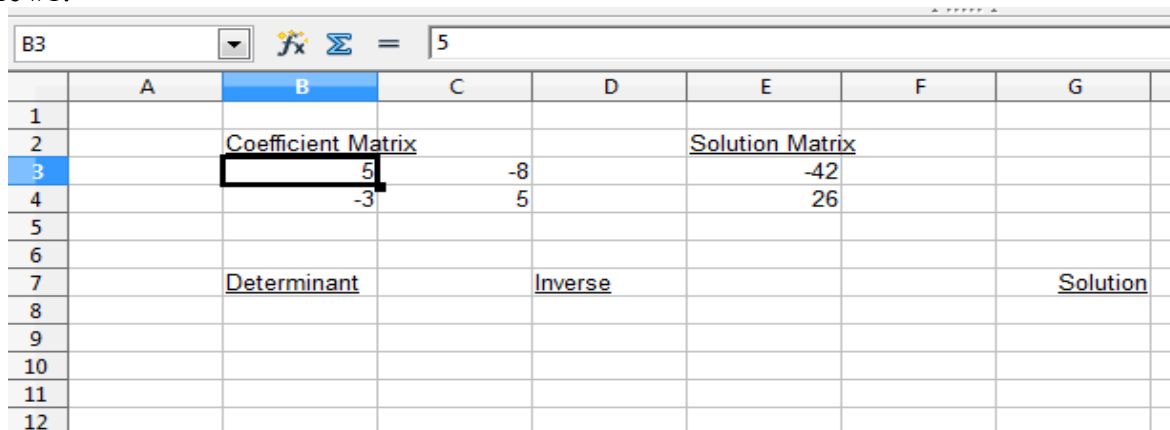
Part A

We will solve page 54 #60 a):

$$5x - 8y = -42$$
$$-3x + 5y = 26$$

Steps:

1. Open a new spreadsheet in Microsoft Excel.

2. Input the all the values from Picture #1 into the appropriate cells. For example, in cell **B3** insert *5*, in cell **C3** insert *-8*.

Picture #1:

3. In cell **C8** enter the formula *=mdeterm(B3:C4)* and press the enter key.
   Note: You can highlight the cells B3:C4 using the mouse instead of typing in *B3:C4* and the program will automatically fill it in the formula for you.

In C8 you should now see the number 1. This is the determinant of the 2x2 matrix.

4. With your mouse, highlight the cells **D8,E8,D9,E9.** Enter the following formula: *=minverse(B3;C4). Press* **CTRL-SHIFT-ENTER.** (Note ENTER will only populate one cell instead of 4.)

You should now see cells **D8;E9** populated with the matrix inverse.

5. With your mouse, highlight the cells **G8** and **G9**. Enter the following formula *=mmult(D8:E9;E3:E4)* and press **CTRL-SHIFT-ENTER**. Your field is now populated with the answer to your matrix equation. (x = -2, y = 4).

	A	B	C	D	E	F	G
1							
2		Coefficient Matrix			Solution Matrix		
3		5	-8		-42		
4		-3	5		26		
5							
6							
7		Determinant		Inverse			Solution
8		1		5	8		-2
9				3	5		4
10							
11							
12							

6. Try changing the values of the Coefficient Matrix and Solution Matrix for the numbers 60 g,h, and i. Do they match your answers from your homework?

Answers: 60 g. (1,-2) h. (-40,-24) i. (6,-2)

Part B

We solve 3x3 matrix equations the exact same way we solve 2x2 matrix equations, however the determinant and inverse of 3x3 matrices are usually too complicated to solve by hand.

Make a new excel file (or modify the one you have) to solve 3x3 equations. Use it to solve the following equations:

a. $x - 3y + 5z = -14$
$2x + y - 6z = 20$
$3x - 2y + z = 0$

b. $-2x + 4y - z = -7$
$x + 2y + 3z = -2$
$4x - 2y + 3z = 14$

c. $x + 3y - 8z = 16$
$2x + y - 4z = -6$
$-x + 2y + 12z = 18$

Answers:
a) (1,0,-3) b) (6,1/2, -3) c) (-7,7,-1/4)

Part C

Make a new excel file and perform a matrix multiplication on the following two charts below (Chart A x Chart B).

a) Fill in Chart C below.
b) In your own words, what does your final answer represent?

Chart A:

	Number of Cars Sold					
Salesperson Name		Civic Coupe	Civic Sedan	Civic Hybrid	Accord Coupe	Accord Sedan
	Tom	1	2	0	2	3
	Jerry	2	4	1	0	0
	Beavis	2	3	3	0	0

Chart B:

	Car Price
Civic Coupe	$18 240
Civic Sedan	$25 990
Civic Hybrid	$24 990
Accord Coupe	$26 790
Accord Sedan	$24 790

Chart C:

_____	
_____	_____
_____	_____
_____	_____