

INSTRUCTIONS: This is a graded assignment. Each person must submit their own solution. Document your assistance in accordance with (IAW) the Documentation of Written Work (DOWW).

1. My niece (Chloe) from Australia has been visiting the states since July. She is going to stay with us from November 9 until Thanksgiving. She is really excited about checking out the sites in New York City. She told us she wanted to see:

- Empire State Building
- Times Square
- Rockefeller Plaza
- United Nations

If she goes during the week, she will have to take the train into Grand Central Station. We will call Grand Central the origin (0,0). Use the map from the website: <http://www.strategyhealth.com/directions/manhattan.gif> to answer the following questions.

- (a) Give her explicit instructions for a route to see all of the 4 sites on her trip and return back to Grand Central Station.
  - (b) Determine a coordinate for each of the 4 sites she would like to see. State your scale.
  - (c) Create a sequence of displacement vectors between each landmark in the order listed in part a.
  - (d) Since she started where she ended, add all the vectors to insure she is back at Grand Central to head home.
2. In class, we discussed a problem of budgeting for a catered affair. Assume we decide not to serve hors d'oeuvres and that the costs stay the same.

	Caterer A	Caterer B	Caterer C
Hero Sandwich	\$4	\$6	\$5
Fruit Punch	\$2	\$1	\$0.85
Potato Salad	\$1.50	\$2	\$2.50
Hors d'oeuvres	\$6	\$5	\$7

- (a) Write down a system of equations describing this scenario. Define all of your variables.
- (b) Using your system of equations, create a matrix-vector product that describes this scenario.
- (c) Suppose you received 3 quotes (without ordering hors d'oeuvres):

Caterer A	\$127.50
Caterer B	\$170.00
Caterer C	\$146.00

but your buddy did not tell you the number of each item he told the caterer. Find out how much was ordered using inverse matrices.

3. Army-Air Force week is approaching most of you will conduct some spirit missions! Let's say your roommates and you come up with 3 missions you want to do - you believe all three can be done multiple times and you can "scale" each mission (i.e. be a 70% participant). The problem is each also takes time, money and likely leads to hours on the area. You decide you are willing to spend \$50, have 8 hours of time available and will suck up 5 hours on the area. A comparison of your missions results in the following. Mission A costs \$9, requires 1 hour and leads to 2 hours on the area. Mission B costs \$16 and takes 3 hours but will only cost you 0.5 hours on the area. Finally, Mission C costs \$8 but only takes 1 hour and results in 1 hour of area tours.

- (a) Write down a system of equations describing this scenario. Define all of your variables.
- (b) Using your system of equations, create an augmented matrix and row reduce it.
- (c) How many of each mission did you do?
- (d) What if you discovered that Mission C only costs \$7?
- (e) What if you discovered that Mission C only costs \$7 AND you decide you can spend \$60?

4. C hour recently decoded a special message from Dr. B to another MA 103 instructor. Because of this breach in security, she has used the matrix

$$\begin{bmatrix} 5 & 3 \\ 7 & 4 \end{bmatrix}$$

to encrypt the new message:

$\langle 125, 172, 161, 220, 148, 203, 123, 167, 195, 269, 120, 167, 107, 149, 80, 107 \rangle$ .

You should decipher your new mission before it is too late.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	space
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27