Homework Set 2 Linear Algebra and Vector Calculus

Due: May 4, 2008

1. This table gives the number of hours of each type done by each worker, and the associated pay rates. Use matrices to compute the wages due.

	regular	overtime		wage
Alan	40	12	regular	\$25.00
Betty	35	6	overtime	\$45.00
Catherine	40	18	'	
Donald	28	0		

2. Use Gauss' method to find each determinant:

	19	1	21		1	0	0	1
(a)	$ \begin{bmatrix} 3 & 1 \\ 3 & 1 \\ 0 & 1 \end{bmatrix} $	1	2	(b)	2	1	1	0
			4		-1	0	1	0
		1	4		1	1	1	0

- 3. Write a program to do a straightforward implementation of calculating determinants via Gauss' method. (Don't test for a zero pivot.). Compare the speed of your code to that used in your computer algebra system.
- 4. Find the inverse, if it exists, by using the Gauss-Jordan method.

	(0	1	5)		(2	2	3)
(<i>a</i>)	0	-2	4	(b)	1	-2	-3
	2	3	-2)		4	-2	-3)

- 5. Use Cramer's Rule to solve this system for *z*.
 - 2x + y + z = 13x + z = 4x y z = 2
- 6. Find the area of the triangle in \mathbb{R}^3 with endpoints (1, 2, 1), (3, -1, 4), and (2, 2, 2). (The triangle defines a plane—what is the area of this triangle in that plane?)
- 7. Write a program to fill a 5×5 array with random numbers (in the range [0..1). See if it is singular. Repeat that experiment a few times. Are singular matrices frequent or rare (in this sense)?