

**Math 266B****Guide for Test 4**

Here are some sample questions from old tests. Some topics that we covered are not represented by these questions, but are still fair game.

1. Solve the systems of equations:

$$(a) \begin{cases} x + y = 1 \\ 3x + 3y = 1 \end{cases}$$

$$(b) \begin{cases} 3x - 2y - z = -9 \\ -x + y + 2z = 5 \\ 5x - 3y + 4z = -9 \end{cases}$$

2. Let  $A = \begin{bmatrix} 2 & 1 \\ 4 & -1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ .

(a) Compute the length of  $B$ .

(b) Write a formula for the angle  $B$  makes with the vector  $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$  (the  $x$ -axis).

(c) Find the transpose of  $A$ .

(d) Compute the determinant of  $A$ .

(e) Compute the trace of  $A$ .

(f) Compute  $AA + 3A$ .

(g) Find  $A^{-1}$ .

(h) Use  $A^{-1}$  to solve the matrix equation  $AX = B$  for  $X$ .

(i) Find the eigenvalues and eigenvectors of  $A$ .

3. Consider (but do not solve) the system of equations

$$\begin{cases} x + 2y = 3 \\ 4x + 5y = 6 \end{cases} .$$

Create a word problem that would result in this system of equations. Describe the meaning of  $x$  and  $y$  in your problem, and what each equation represents.