

Math 392 Test 4A

May 15, 2018

Name: \_\_\_\_\_

Note that both sides of each page may have printed material.

**Instructions:**

1. Complete all problems in the actual test. Bonus problems are, of course, optional. And they will only be counted if all other problems are attempted.
2. Show ALL your work to receive full credit. You will get 0 credit for simply writing down the answers.
3. Write neatly so that I am able to follow your sequence of steps and box your answers.
4. Read through the exam and complete the problems that are easy (for you) first!
5. No calculators, notes or other aids allowed! Including, but not limited to, divine intervention/inspiration, the internet, telepathy, knowledge osmosis, the smart kid that may be sitting beside you or that friend you might be thinking of texting. In fact, **cell phones should be out of sight!**
6. Use the correct notation and write what you mean!  $x^2$  and  $x2$  are not the same thing, for example, and I will grade accordingly.
7. Don't commit any of the blasphemies mentioned in the syllabus!
8. Other than that, have fun and good luck!

You survived to the end of Math 392???

**SOMEBODY**



**GIVE THAT PERSON A MEDAL!!!**

1. Let  $A = \begin{pmatrix} 1 & 2 & 2 \\ 1 & 0 & 1 \\ 1 & 2 & 1 \end{pmatrix}$ .

(a) (20 points) Find the inverse of  $A$ .

(b) (10 points) Use your answer to part (a) to solve the system

$$x + 2y + 2z = 1$$

$$x + z = 1$$

$$x + 2y + z = 0$$

2. Let  $A = \begin{pmatrix} 1 & 2 & 2 \\ 1 & 0 & 1 \\ 1 & 2 & 1 \end{pmatrix}$ .

(a) (20 points) Compute: (i)  $\det A$ , (ii)  $\det A^{-1}$ , (iii)  $\det(2A^3 A^T A^{-2})$ .

(b) (10 points) Use Cramer's Rule to solve for  $x$  only (do not solve for  $y$  or  $z$ !!!) in the following system. No credit for any other method.

$$x + 2y + 2z = 1$$

$$x + z = 1$$

$$x + 2y + z = 0$$

3. Let  $A = \begin{pmatrix} 7 & 3 \\ 3 & -1 \end{pmatrix}$ .

- (a) (30 points) Find the eigenvalues and corresponding eigenvectors of  $A$ . Indicate which vectors correspond with which values using appropriate notation.

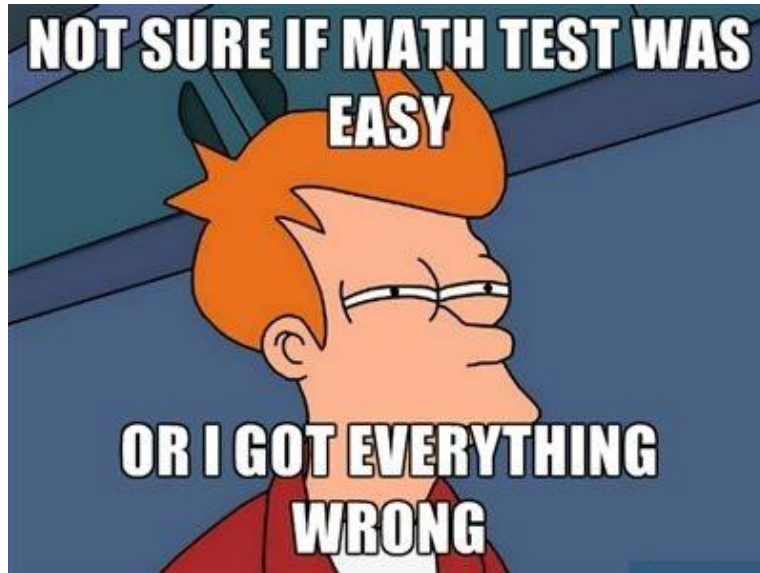
(b) (10 points) Use your answer in part (a) to find the general solution to the system

$$\begin{aligned}y_1' &= 7y_1 + 3y_2 \\y_2' &= 3y_1 - y_2\end{aligned}$$

**Bonus Problems: Note that you must attempt all problems in the actual test to be eligible to attempt the bonus problems. Otherwise, anything you write on this page will be disregarded.**

1. Let  $A$  be the matrix in problem 3. Diagonalize  $A$  by finding an invertible matrix  $P$  and a diagonal matrix  $D$  such that  $A = PDP^{-1}$  (5 points).
2. Let  $A$  be as in problem 1 above. Compute  $A^6$  as a  $2 \times 2$  matrix (5 points).
3. A thin wire is bent into the shape of a semi-circle  $x^2 + y^2 = 4, x \geq 0$ . If the linear density is given by  $\rho(x, y) = y + 1$ , find the mass of the wire (5 points).

4. Let  $\vec{F} = \langle 4y, 2x, 4y - 4x \rangle$ . Find  $\int_C \vec{F} \cdot d\vec{r}$  where  $C$  is the circle of radius 2 in the plane  $x + y + z = 4$  centered at  $(4, 4, -4)$  and oriented clockwise when viewed from the origin (5 points).



Jhevon: \*SLAP\* ALWAYS believe in yourself! No matter what!

Me knowing Jhevon speaks truth:



**75% of students  
doesn't know about  
math !**



**But, i am in remaining %18.**