

Third Exam

Thursday, October 18, 2016

This exam is closed book, but you may use calculators that do not have computer algebra systems. Make sure your name is on all pages. Show all work, and show it in a logical and organized manner: You will be graded on what you show, in addition to your answer. Check your work carefully. Each entire problem is worth 16 points, and 4 points are free. You may keep this exam sheet on leaving.

1. Find the angle in radians between $(1, -1, 1)$ and $(1, 2, 3)$. (You will need your calculator.)
2. Find the projection of $(1, 2, 3, 4, 5, 6)$ onto $(1, -1, 1, -1, 1, -1)$.
3. Find an equation of the plane through $(2, 1, 3)$, $(1, 1, 1)$ and $(-1, 1, -1)$.
4. Write the general solution to the $Ax = b$ as a linear combination of a specific solution of $Ax = b$ and the general solution of $Ax = 0$, where

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \quad \text{and} \quad b = \begin{bmatrix} -1 \\ 1 \end{bmatrix}.$$

5. Find a parametrization for the line segment connecting $(-2, 1, 3)$ and $(4, 4, 4)$. (Give a vector equation and a parameter range.)
6. Do the same thing as in Problem 4, except with

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ -1 & 1 & -1 & 1 \\ 0 & 3 & 2 & 5 \\ 2 & 1 & 4 & 3 \end{bmatrix} \quad \text{and} \quad b = \begin{bmatrix} 1 \\ 2 \\ 3 \\ -1 \end{bmatrix}.$$