Review Test Submission: Exam 3

User	Phong Vo
Course	MATH 2210 P 1 201 Linear Algebra I Spring 2020
Test	Exam 3
Started	5/1/20 6:24 PM
Submitted	5/1/20 8:17 PM
Due Date	5/1/20 11:59 PM
Status	Needs Grading
Attempt Score	Grade not available.
Time Elapsed	1 hour, 52 minutes out of 2 hours
Instructions	**Assignment:** First, take the Exam 3 within. Please write out each question at the start of your Exam, just in case there is a technical issue. Afterward, scan your handwritten work and submit the PDF as an attachment in the "Dropbox". In the case of a technical issue, please leave me a note with your PDF attachment in the Dropbox. **Due Date**: Friday, May 1st, at 11:59PM

Question 1   Needs Grading

Suppose that $T: \mathbb{R}^4 \to \mathbb{R}^6$ is a Linear Transformation.

(a) [2pts] If the $\dim[Nul(T)] = 2$, then find $\dim[rank(T)]$.

(b) [2pts] If the $\dim[rank(T)] = 3$, then find $\dim[Nul(T)]$.

Question 2   Needs Grading

Determine which of the following sets is a Vector Space.
Construct geometric figures that illustrate why each set is or is not a Vector Space.
For the two sets that are not Vector Spaces, find a specific example to show that they are not a Vector Space.

E is the line y = x in the xy − plane: $E = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : y = x \right\}$

R is the union of the 1st and 2nd quadrants in the xy − plane: $R = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : y \geq 0 \right\}$

Y is the line y = x + 1 in the xy − plane: $Y = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : y = x + 1 \right\}$

Question 3

Needs Grading

Determine whether the set of polynomials is linearly independent or linearly dependent:

$$\vec{p_1}(t) = 1 \;,\; \vec{p_2}(t) = -2 + 4t^2 \;,\; \vec{p_3}(t) = 2t \;,\; \vec{p_4}(t) = -12t + 8t^3$$

Question 4

Needs Grading

Consider the Vector Space $V = \mathbb{P}_2$, with the following Bases:

$$B = \{\, t - 1 \,,\, t + 1 \,,\, t^2 - 1 \,\} \quad \& \quad C = \{\, 1 \,,\, t + 1 \,,\, t^2 + t \,\}$$

(a) [6pts] Find the Change of Coordinates Matrix from B to C.

(b) [6pts] Express the vector $\vec{p}(t) = t^2 - t + 5$ relative to Basis B.

Question 5

Needs Grading

Define a Linear Transformation $T: \mathbb{R}^4 \to \mathbb{R}^3$ by:

$$T(\, x_1 \,,\, x_2 \,,\, x_3 \,,\, x_4 \,) = (\, x_1 + x_2 - x_3 + x_4 \,,\, 2x_1 + x_2 + 4x_3 + x_4 \,,\, 3x_1 + x_2 + 9x_3 \,)$$

(a) [6pts] Find the Basis for the Column Space of T.

(b) [6pts] Find the Basis for the Row Space of T.

(c) [6pts] Find the Basis for the Null Space of T.

(d) [2pts] List the rank(T) and dim[Nul(T)].

Friday, May 1, 2020 8:18:47 PM EDT

← **OK**