Exam #3

ⓘ This is a preview of the published version of the quiz

Started: Apr 25 at 3:21pm

Quiz Instructions

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The following is Exam #3. You will have until Wednesday, February 9th at 11:59 PM to complete this exam. Please complete this exam on separate paper or on a tablet. Clearly indicate the question number for each question. Please show all work and clearly indicate your answers. Remember, this exam is an opportunity for you to demonstrate what you know. It is acceptable to use your notes. I understand that there may be discussions, which I am not opposed to. Just please do not simply give away answers. Also, please do not use any online resources or websites to request others to do questions for you. It is fine for you to visit my office hours or send me an email to ask me questions.

For this exam, do not click on "Submit". Once you do, you will not be able to access the exam again. You can simply close your web browser when you are finished working for the moment.

When you are ready to submit your exam, you will not submit the exam to this assignment. You will submit your exam through the "**Exam #3 Submission**" assignment. This assignment can be found under the Assignments menu option to your left. You can use a device to scan your exam.

(6 points) 1. Show that the set of 2×2 upper triangular matrices is a subspace of $M_{2,2}$.

(6 points) 2. Show that $S = \{(0, b, c) | b, c \in \mathbb{R}\}$ is a subspace of $\mathbb{R}^3$.

(5 points) 3. Write the vector $\vec{v} = (4, 4, 5)$ as a linear combination of the vectors in the set $S = \{(1, 2, 3), (-2, 0, 1), (1, 0, 0)\}$, if possible.

(5 points) 4. Determine if the following vectors are linearly independent or linearly dependent: $S = \{(2, 0, 1), (2, -1, 1), (4, 2, 0)\}$

(5 points) 5. Determine if the following vectors span $\mathbb{R}^3$:
$S = \{(4, 0, 1), (0, -3, 2), (5, 10, 0)\}$

(5 points) 6. Determine if the following vectors are linearly independent or linearly dependent: $S = \{(4, -3, 6, 2), (1, 8, 3, 1), (3, -2, -1, 0)\}$

(6 points) 7. Determine if $S = \{1 + x, 2x + x^2, 2 + x + 3x^2\}$ is a basis for P_2.

(6 points) 8. Determine if $S = \left\{ \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \right\}$ is a basis for $M_{2,2}$.

9. Explain why the following sets do not form a basis of the given vector space.

(3 points) a. $V = \mathbb{R}^3;\ S = \{(2,1,0),(1,0,0),(0,1,0)\}$

(3 points) b. $V = \mathbb{R}^3;\ S = \{(1,4,2),(3,2,1),(0,0,0)\}$

(3 points) c. $V = \mathbb{R}^3;\ S = \{(1,1,0),(1,0,1),(0,1,1),(1,1,1)\}$

(3 points) d. $V = \mathbb{R}^3;\ S = \{(1,2,3),(2,1,3)\}$

(3 points) e. $V = M_{2,2};\ S = \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix} \right\}$

10. Given the matrix $A = \begin{bmatrix} 2 & -3 & 1 \\ 5 & 10 & 6 \\ 8 & -7 & 5 \end{bmatrix}$.

(5 points) a. Find a basis for the row space of A.

(2 points) b. Find a basis for the column space of A.

(1 points) c. Find rank(A).

11. Given the matrix $A = \begin{bmatrix} 1 & 4 & 2 & 1 \\ 0 & 1 & 1 & -1 \\ -2 & -8 & -4 & -2 \end{bmatrix}$.

(5 points) a. Find the nullspace of A.

(2 point) b. Find a basis for the nullspace of A.

(1 points) b. Find nullity(A).