Mathematics 1350H – Linear algebra I: matrix algebra
Trent University, Fall 2008
Quizzes

Quiz #1. Friday, 19 September, 2008. *[5 minutes]*

1. Sketch the vector $\begin{bmatrix} 2 \\ 4 \\ 4 \end{bmatrix}$ (in standard position) and find its length. *[5]*

Quiz #2. Friday, 26 September, 2008. *[5 minutes]*

1. Let $\mathbf{a} = \begin{bmatrix} 3 \\ -1 \\ 0 \\ -3 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 1 \\ 0 \\ 1 \\ -1 \end{bmatrix}$. Compute $\text{proj}_{\mathbf{b}}(\mathbf{a})$. *[5]*

Quiz #3. Friday, 3 October, 2008. *[5 minutes]*

1. Find the (least) distance from the point $(0, 0, 0)$ to the plane $x + y + z = 12$. *[5]*

Quiz #3. *Alternate version. [5 minutes]*

1. Find the (least) distance from the point $(1, 1, 1)$ to the plane $x - y + z = 4$. *[5]*

Quiz #4. Friday, 10 October, 2008. *[5 minutes]*

1. Solve the following system of linear equations using Gauss-Jordan reduction. *[5]*

$$
\begin{array}{rcrcrcrcl}
x & & & + & z & & & = & 0 \\
 & y & & & & - & w & = & 0 \\
x & & & - & z & & & = & 1 \\
 & y & & & & + & w & = & 1
\end{array}
$$

Quiz #5. Friday, 17 October, 2008. *[10 minutes]*

1. Determine whether $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ is in Span $\left\{ \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ 0 \\ 4 \end{bmatrix} \right\}$ or not. *[5]*

Quiz #6. Friday, 31 October, 2008. *[10 minutes]*

1. Use the Gauss-Jordan method to find the inverse of $\begin{bmatrix} 3 & 1 & 2 \\ 2 & 3 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. *[5]*

Quiz #7. Friday, 7 November, 2008. *[10 minutes]*

1. Suppose $\mathbf{A}$ is an $n \times n$ matrix which has an inverse, and suppose $\mathbf{a}_1, \mathbf{a}_2, \ldots, \mathbf{a}_n$ are the columns of $\mathbf{A}$. What can you deduce about this collection of vectors? *[5]*

Quiz #8. Friday, 14 November, 2008. *[5 minutes]*

1. Determine whether $U = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} \ \middle| \ |x| = |y| \right\}$ is a subspace of $\mathbb{R}^2$ or not. *[5]*

Quiz #9. Friday, 21 November, 2008. *[10 minutes]*

1. Find a spanning set for the subspace

$$S = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} \middle| \begin{array}{rcrcrcrcl} x & + & 2y & & & & & = & 0 \\ & & 2y & + & z & & & = & 0 \\ -x & + & 2y & + & 2z & & & = & 0 \end{array} \right\}$$

of $\mathbb{R}^3$. *[5]*

Quiz #10. Friday, 28 November, 2008. *[12 minutes]*

1. Determine the dimension of the subspace

$$S = \text{Span} \left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \\ 1 \end{bmatrix} \right\}$$

of $\mathbb{R}^4$. *[5]*

Quiz #11. Friday, 5 December, 2008. *[10 minutes]*

1. Find the the eigenvalue(s) and all the eigenvectors of $\begin{bmatrix} 2 & -1 \\ 1 & 0 \end{bmatrix}$. *[5]*