Mathematics 1350H – Linear algebra I: Matrix algebra
TRENT UNIVERSITY, Summer 2013

Quizzes

Quiz #1. Wednesday, 15 May, 2013. *[10 minutes]*

1. Draw a sketch of the points $(1, 0, 1)$ and $(0, 1, 1)$, and the line joining them. (A crude sketch will suffice. :-) *[1.5]*
2. Find a vector parallel to the line. *[1.5]*
3. Determine whether the vector $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$ is perpendicular to the line or not. *[2]*

Quiz #2. Wednesday, 22 May, 2013. *[10 minutes]*

Let $\mathbf{i} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$.

1. Find a vector $\mathbf{u}$ such that the angle between $\mathbf{i}$ and $\mathbf{u}$ is $\frac{\pi}{4}$ radians (*i.e.* 45°). *[3]*
2. Verify that the angle between $\mathbf{i}$ and $\mathbf{u}$ really is $\frac{\pi}{4}$ radians. *[2]*

Quiz #3. Monday, 27 May, 2013. *[15 minutes]*

1. Find all the solutions, if any, to the following system of linear equations:

$$\begin{array}{rcrcrcl} 2x & + & 3y & + & z & = & 6 \\ -x & + & y & + & z & = & 1 \\ 3x & - & y & - & z & = & 1 \end{array} \qquad [5]$$

Quiz #4. Wednesday, 29 May, 2013. *[15 minutes]*

1. Use Gauss-Jordan reduction to find all the solutions, if any, to the following system of linear equations:

$$\begin{array}{rcrcrcrcl} w & + & x & + & y & & & = & 1 \\ w & & & + & 2y & & & = & 1 \\ w & & & + & y & + & z & = & 1 \\ w & + & x & & & + & z & = & 1 \end{array} \qquad [5]$$

Quiz #5. Wednesday, 5 June, 2013. *[10 minutes]*

1. Find the inverse, if any, of the following matrix:

$$\begin{bmatrix} 2 & 3 & 1 \\ -1 & 2 & 3 \\ 2 & 1 & -1 \end{bmatrix} \qquad [5]$$

Quiz #6. Monday, 10 June, 2013. *[10 minutes]*

1. Let $M = \left\{ \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, \begin{bmatrix} 2 \\ 5 \\ 5 \end{bmatrix}, \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}, \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix} \right\}$. Find a minimal spanning subset of M, *i.e.* a set $P \subseteq M$ that is as small as possible and such that $\text{Span}(P) = \text{Span}(M)$. *[5]*

Quiz #7. Wednesday, 12 June, 2013. *[12 minutes]*

Let $\mathbf{A} = \begin{bmatrix} 2 & -2 & 1 & 0 \\ -1 & 1 & 0 & 1 \\ 3 & 1 & 0 & 5 \end{bmatrix}$.

1. Use the Gauss-Jordan method to put $\mathbf{A}$ in row-reduced echelon form. *[2]*

2. Find a basis for *two* (2) of the following three subspaces:
i. $\text{col}(\mathbf{A})$ *ii.* $\text{row}(\mathbf{A})$ *iii.* $\text{null}(\mathbf{A})$ *[3 = 2 × 1.5 each]*

Quiz #8. Monday, 17 June, 2013. *[15 minutes]*

Let $W = \text{Span} \left\{ \begin{bmatrix} 1 \\ -1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 3 \\ -1 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ -3 \\ 1 \\ 3 \end{bmatrix} \right\}$.

1. Find an orthogonal basis for W. *[5]*