## TRENT UNIVERSITY, Summer 2017

## MATH 1350H Test

Monday, 29 May Time: 60 minutes

## Instructions

- Show all your work. Legibly, please!
- If you have a question, ask it!
- Use the back sides of the test sheets for rough work or extra space.
- You may use a calculator and an aid sheet.
- **1.** Do **a** and any two (2) of **b**-**d**.  $[10 = 2 + 2 \times 4 \text{ each}]$ Consider the lines given by the equations x - 2y = 2 and 2x + y = -2.
- **a.** Sketch a graph of the two lines including their x- and y-intercepts.
- **b.** Find the point where the lines intersect.
- **c.** Find vector-parametric equations for each of the lines.
- **d.** Find the angle between the lines.
- **2.** Do any *two* (2) of **a**-**c**.  $/10 = 2 \times 5 \ each/$

Let 
$$\mathbf{u} = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$$
,  $\mathbf{v} = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$ , and  $\mathbf{w} = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$ .

- $\mathbf{a}$ . Find the components of  $\mathbf{w}$  that are, respectively, parallel to and perpendicular to  $\mathbf{v}$ .
- **b.** Solve  $2\mathbf{u} + 4\mathbf{w} + 5\mathbf{x} = -3\mathbf{v}$  for  $\mathbf{x}$ .
- $\mathbf{c}$ . Find the angle between  $\mathbf{u}$  and  $\mathbf{v}$ .

- ${\bf a.}\;$  Find all the solutions, if any, of this system. [8]
- **b.** Use your solution to **a** to help determine whether the vectors  $\begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}$ ,  $\begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$ , and  $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$  are linearly independent. [2]

**4.** Let 
$$S = \left\{ \begin{bmatrix} 1\\1\\1\\1 \end{bmatrix}, \begin{bmatrix} 1\\0\\1\\1 \end{bmatrix}, \begin{bmatrix} 1\\1\\0\\1 \end{bmatrix} \right\}$$
, and let  $\mathbf{x} = \begin{bmatrix} 1\\0\\0\\1 \end{bmatrix}$ .

- **a.** Determine whether  $\mathbf{x} \in \text{Span}(S)$ . [8]
- **b.** Determine whether S is a linearly independent set of vectors. [2]

[Total = 40]