Math 2210-006/011 Quiz 4 **Name:** Key **Due:** 9/30/19

This is a two-stage quiz. You will receive this back with each question graded pass/fail in our next class meeting. You have until the date specified above to submit corrections for partial credit.

1. (4 points) Consider the following matrix and its reduced echelon form

$$A = \begin{bmatrix} 1 & 1 & 0 \\ -2 & 0 & 2 \\ 1 & 6 & 5 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{bmatrix}.$$

(i) Give in parametric vector form the solution set of the homogeneous equation $A\mathbf{x} = \mathbf{0}$.

$$[A \ \vec{0}] \sim \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \Rightarrow \begin{array}{l} x_1 = x_3 \\ x_2 = -x_3 \end{array}$$

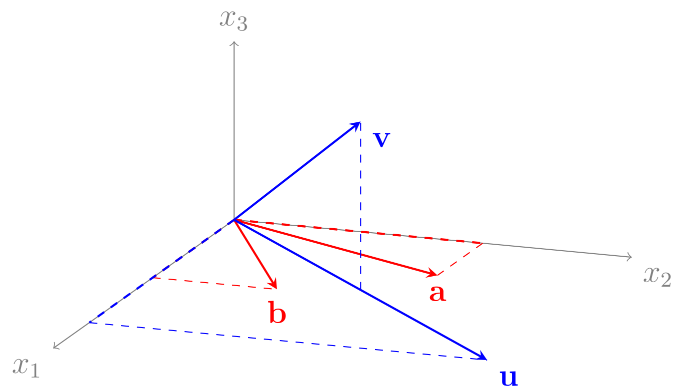
so $\boxed{\vec{x} = x_3 \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}}$

(ii) Note that $A\mathbf{p} = \mathbf{b}$ if $\mathbf{p} = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 1 \\ 0 \\ 6 \end{bmatrix}$. Give in parametric vector form the solution set of the nonhomogeneous equation $A\mathbf{x} = \mathbf{b}$.

If $A\vec{x} = \vec{b}$ then

$$\vec{x} = \underbrace{\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}}_{\vec{p}} + t \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$$

2. (2 points) Consider the vectors **a**, **b**, **u**, **v** given below.



Is $\{\mathbf{a}, \mathbf{b}, \mathbf{u}\}$ linearly independent? No

Is $\{\mathbf{a}, \mathbf{b}, \mathbf{v}\}$ linearly independent? Yes

3. (4 points) Consider the vectors

$$\mathbf{v_1} = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} \mathbf{v_2} = \begin{bmatrix} 1 \\ 0 \\ 6 \end{bmatrix} \mathbf{v_3} = \begin{bmatrix} 0 \\ 2 \\ 5 \end{bmatrix}.$$

Is $\{v_1, v_2, v_3\}$ linearly independent? Justify your answer.

No, $-\vec{v}_1 + \vec{v}_2 = \vec{v}_3$ is a linear dependence relation.

(i.e. $\underbrace{-\vec{v}_1 + \vec{v}_2 - \vec{v}_3 = \vec{0}}_{\hookrightarrow \text{ non-trivial}}$)