**Math 1553 Worksheet 8**

October 21, 2016

**1.** Let $A = \begin{pmatrix} 2 & -8 & 6 & 8 \\ 3 & -9 & 5 & 10 \\ -3 & 0 & 1 & -2 \\ 1 & -4 & 0 & 6 \end{pmatrix}$.

**a)** Compute $\det(A)$ using row reduction.

**b)** Compute $\det((A^T)^5)$ without doing any more work.

**c)** Compute $\det(A^{-1})$ without doing any more work.

**2.** Sing the eigenvector song: ♫ *an eigenvector is a* $v$ *where* $A$ *times* $v$ *is* $\lambda v$. ♪♩

**3.** Determine whether the following statements are always true or sometimes false. In the latter case, correct it to make a true statement.

**a)** A matrix $A$ is not invertible if 0 is an eigenvalue of $A$.

**b)** If $v_1$ and $v_2$ are linearly independent eigenvectors of $A$, then they must correspond to different eigenvalues.

**c)** The entries on the main diagonal of $A$ are the eigenvalues of $A$.

**d)** The eigenvectors are in the range of the matrix $A-\lambda I$.

**e)** The number $\lambda$ is an eigenvalue of $A$ if and only if there is a nonzero solution to the equation $(A-\lambda I)x=0$.

**f)** To find the eigenvectors of $A$, we reduce the matrix $A$ to row echelon form.

**4.** Find a basis for the $(-1)$-eigenspace of the following matrices.

**a)** $A=\begin{pmatrix} 2 & 3 & 1 \\ 3 & 2 & 4 \\ 0 & 0 & -1 \end{pmatrix}$

**b)** $A=\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$