Linear Algebra Quiz 3

Name:_____

1. Let $A = \begin{bmatrix} 9 & 4 \\ -4 & -1 \end{bmatrix}$. Find the eigenvalues of A. (6 pts)

2. Let $A = \begin{bmatrix} 4 & 0 & 1 \\ 0 & 5 & 0 \\ 1 & 0 & 4 \end{bmatrix}$. One of the eigenvalues of A is 5. Find a basis for the eigenspace associated with the eigenvalue 5. (7 pts)

3. Let $A = \begin{bmatrix} 1 & 1 & 1 \\ -1 & 3 & 1 \\ 0 & -3 & 1 \end{bmatrix}$. For what value (if any) of c is the vector $\mathbf{v} = \begin{bmatrix} 2 \\ -1 \\ c \end{bmatrix}$ an eigenvector of A? Either find c and the associated eigenvalue, or explain why no such c exists. (7 pts)

Bonus: Determine if the following is true or false. Give a proof or counterexample. (5 pts)

If A has eigenvalue λ, then $A + A^T$ must have eigenvalue 2λ.