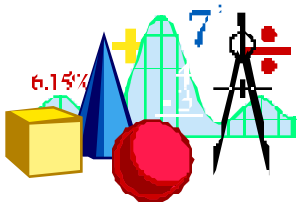
Math 4305 - Home Quiz **Due: Wednesday, March 15**

This will take the place of Quiz 3, scheduled for the infamous no-snow day on which our class was canceled. As usual, you may use any books, notes, calculators, or computers you wish. I ask only that you do your own work and consult only inanimate references—except, of course, you may consult me.



In each of the following, give an example of a linear space **V** and a linear function $\mathbf{T} : \mathbf{V} \to \mathbf{V}$ of the type described, or explain carefully why there can be no such example. You need to convince me that your example is an example.

1. No element of **V** is an eigenvector of **T**.

2. Every nonzero element of **V** is an eigenvector of **T**.

3. Every scalar is an eigenvalue of **T**.

4. The dimension of **V** is n , and the number of distinct eigenvalues of **T** is greater than n.

5. The dimension of **V** is n , and the number of distinct eigenvalues of **T** is less than n.

6. The dimension of **V** is n , and the number of distinct eigenvalues of **T** is n.

7. The dimension of **V** is n , the number of distinct eigenvalues of **T** is less than n, and there is a collection of eigenvectors that spans **V**.

8. The function **T** has an inverse and 0 is an eigenvalue of **T**.

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