CST325 HW 3.1 – Matrix Concepts

Questions are worth 2 points each (total of 20 points)

From [Essence of Linear Algebra](https://www.youtube.com/playlist?list=PLZHQObOWTQDPD3MizzM2xVFitgF8hE_ab) Playlist (videos 3 through 7)

For each question, mark all that apply.

1. What properties must hold for a transformation to be considered linear?

1. Preserve origin
2. Preserves lines and parallel lines remain parallel and evenly spaced
3. Moves object along a straight line

2. If a transformation is linear, what is a consequence of applying that transformation to a vector?

1. Its coordinates still specify a linear combination in the new basis
2. It will be a pure rotation
3. It will be a pure scale
4. It will not change

3. (True / False) A linear transformation is completely determined by where it takes the basis vectors of the space. TRUE

4. (True / False) Multiple transformations can be expressed with a single matrix.

5. Why is matrix multiplication typically applied from right to left?

1. By convention, it could be left to right
2. Because it matches function notation
3. It doesn’t, it happens left to right

6. Which operation tells you how much a given transformation scales space (and the things within it)?

1. Inverse
2. Rotation
3. The determinant

7. (True / False) Matrix transformations with negative determinants shrink space. FALSE

8. (True / False) A determinant of 0 means the basis vectors are linearly independent.

9. (True / False) A determinant of 0 means the transformation has an inverse. FALSE

10. (True / False) A 3D dimensional transformation with rank 3 will have a non-zero determinant.