**LINEAR ALGEBRA PROJECT**

**Part 3: Four Major Subspaces**

Instructions:

1. Read carefully through Part 3 and 4 of the project.
2. The math on paper
   1. Create a non-trivial 3x3 matrix *A* that is not invertible (this should not match an example in the book). *A* should have two linearly independent rows.
   2. Find bases for:
      1. The row space of *A* (you may need to look up the row space)
      2. The image of *A*
      3. The kernel of *A*, and
      4. The kernel of *A*T (you may need to look up the transpose)
   3. Check with me to make sure your *A* and these bases are correct. It is nice to know the math is right before you begin to build.
3. Model 1: Row space and kernel
   1. Put your name(s) on your models
   2. Build a 3D model using your ingenuity and creativity that shows the row space, kernel, and the relationship between the subspaces.
   3. This should be built to scale with labeled axes (label *x*, *y*, *z* and also the scale 1, 2, 3, …)
   4. Make sure all vectors *and* subspaces are clearly labeled.
   5. Note: Should you find it helpful, it is acceptable to adjust your matrix *A* to allow for easier modeling.
   6. Hint: You may find it helpful to look at the grading rubric to see what I am looking for.
4. Model 2: Image and the transpose of the kernel
   1. Put your name(s) on your models
   2. Build a 3D model using your ingenuity and creativity that shows the image, transpose of the kernel, and the relationship between the subspaces.
   3. This should be built to scale with labeled axes (label *x*, *y*, *z* and also the scale 1, 2, 3, …)
   4. Make sure all vectors *and* subspaces are clearly labeled.

**LINEAR ALGEBRA PROJECT**

**Part 3: Four Major Subspaces**

Rubric:

1. Create a matrix *A* that is not invertible (this should not match an example in the book) size 3x3.
   1. 0 points
2. Find bases for the row space of *A*, image of *A*, kernel of *A*, and kernel of *A*T
   1. 1 point for each subspace.
   2. -0.5 if a redundant vector
   3. -0.5 if span is used incorrectly
3. Suggestion: Check your A and subspaces with me prior to beginning to build.
4. By the deadline have two displays (3D models), one with row space and kernel of *A* indicated, and another with the image of *A* and the kernel of *A*T indicated.
   1. Display 1: row space and kernel of *A*\_\_\_\_\_ Correct vectors  
      \_\_\_\_\_ Orthogonal  
      *\_\_\_\_\_* Span
   2. Display 2: image of A and the kernel of *A*T

\_\_\_\_\_ Correct vectors  
\_\_\_\_\_ Orthogonal  
*\_\_\_\_\_* Span

1. Late submissions will be accepted within reason, but will have 2 points deducted from their final score.

*Total points = 10*