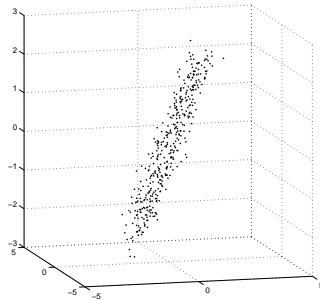


# Midlecture Problem

If you had a 3D dataset like this



**How many principal components does it have?**

This is a bit of a trick question. As the data is 3D, it will always have 3 principal components. However, if I had said “How many significant principal components does it have?” the answer would be different. Notice that the data tends to be an elongated blob (or a plane, depending on the observer viewpoint). If it was the elongated blob, then there is only one significant principal component, in the direction of elongation. The other 2 principal components would be much smaller and related to the noise.