**Answer 1:**

**Answer 3**:

For a polygon mean is the centroid.

The angle between vectors (sides of polygon) and the value of their norms do not change.

The distance and angular metrics between a set of points remains. This indicates that there is no loss of information as there is no dimenionality reduction.

The eigen values indicate the relative importance of each eigen vector in computing the above metrics.

In comparison with using either of the original dimensions, using the principal component to compare the metrics would give better similarities/dissimilarites between the data points.