

1. Given the data visualized below with the classes represented by different colors, should PCA or kernel PCA be used, and why?

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- ☐ Neither because the data cannot be projected onto a lower dimension.
- ☐ Either is fine because the two classes are clearly separable.
- ☒ Kernel PCA because the data is not linearly separable.
- ☐ PCA because the data is clearly separable when projected onto a lower dimension.

✔ **Correct**
Correct! If the data is projected directly onto a lower dimension, the different classes cannot be clearly separated with a single plane. Hence, we use a kernel function to map it to a higher dimension first, before applying PCA.

2. How does the goal of MDS (Multidimensional Scaling) compare to PCA?

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- ☐ PCA tries to maintain geometric distances between data points, whereas MDS tries to preserve variance within data.
- ☐ Both MDS and PCA try to preserve variance within data.
- ☒ MDS tries to maintain geometric distances between data points, whereas PCA tries to preserve variance within data.
- ☐ Both MDS and PCA try to to maintain geometric distances between data points.

✔ **Correct**
Correct! Although both are dimensionality reduction techniques, MDS will not strive to maintain the variance within the original data.

3. (True/False) If the number of components is equal to the dimension of the original features, kernel PCA will reconstruct the data, returning the original.

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- ☒ False
- ☐ True

✔ **Correct**
Correct! Kernel PCA spans a subspace of the original data, so applying inverse transformation on the data after kernel PCA will not return the original data. You can review Practice lab: Kernel PCA for more information.