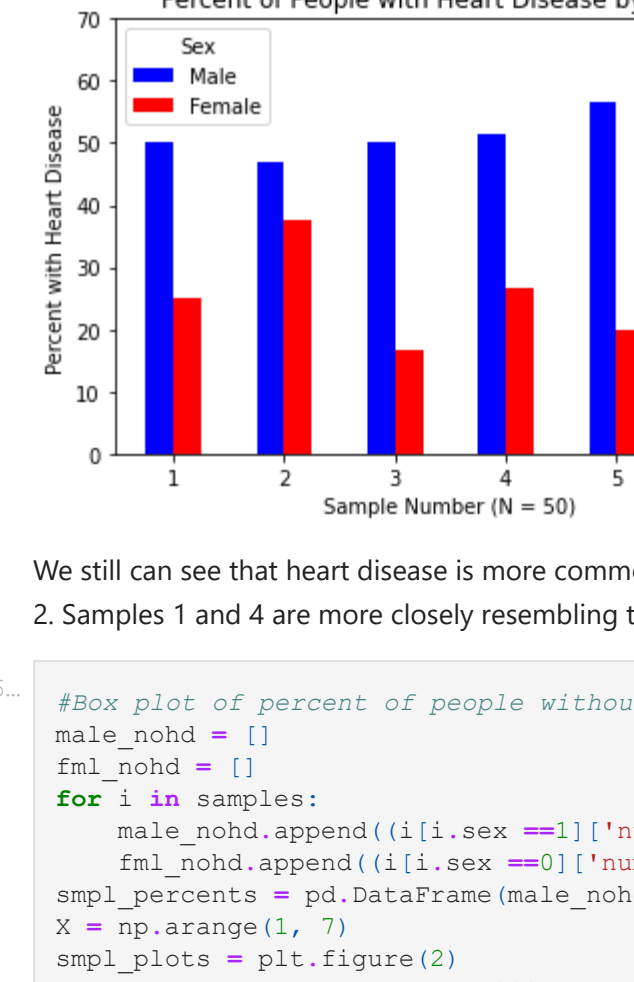


Percent of People with Heart Disease by Gender



We still can see that there is a much larger percentage of females without heart disease than males.
Compare results from a with results from f11

I have already written in the comments on the above plots, but I can reemphasize the main points. Generally, heart disease is shown to be more common in men than women for the above samples. Similarly, there are more women without heart disease than men without heart disease. This is most clearly seen from the bar plots that were created. The boxplots from the whole dataset and the samples all show that heart disease is present but not present does not have a correlation with the gender of the individual (which is why the box covers the entirety of the dataset). Also, it is suggested that someone is more likely to be a male if they have heart disease. This is because the outlier is displayed on the 0 value, representing female, while the median value (and basically the entirety of the box plot for this on the 0 value, representing male) there are one sample, the second sample boxplot, in which we saw a more balanced distribution between males and females having heart disease. So all we have needed to see there being more males with the disease than females. This sample probably just included a lot more females without heart disease than average.

Problem 3:

You are given a set of n m objects that is divided into K groups, where the i -th group is of size m_i . If the goal is to obtain a sample of size n < m , what is the difference between the following two sampling schemes? (Assume sampling with replacement.)

a. We randomly select n m_i m elements from each group.

Randomly selecting n m_i m elements from each group would be stratified sampling, which means that the sample from each group is proportional to its size relative to the total number of objects. We guarantee that we have at least one observation from each of our K groups.

b. We randomly select n elements from the data set, without regard for the group to which an object belongs.

Randomly selecting n elements from the data set, without regard for the group to which an object belongs—is just random sampling, which means each sample has an equal probability of being chosen. Here, the only way to guarantee that we have an observation from each group is if we have n elements. However, that is not allowed because we want $n < m$ elements.

Difference: The first sampling scheme is guaranteed to get the same number of objects from each group, while the second sampling scheme does not get this guarantee. The number of objects from each group can and will vary. This is because the second sampling scheme only guarantees that, on average, the number of objects from each group will be n/m . Thus, the first sampling scheme will have less variance than the second random sampling scheme since the latter also includes the variance between the different groups. Also, if the objects in each group are alike, then the first sampling technique guarantees a sample from each group, which can be useful in analysis whenever the sample size is large enough. These advantages of the stratified sampling make it generally more accurate than the second sampling scheme's simple random sampling.

Problem 4:

Find a PCA package and use it to compute eigenvectors and eigenvalues for the images.

a. Compute 2, 5, and 10 principal components and show original and the resulting images.

b. What is the minimal number of principal components needed to retain 80% of data variance?

In [188]:
import numpy as np
from sklearn.decomposition import PCA
from sklearn.preprocessing import StandardScaler

In [231]:
#Normalizing the data
x = df[['hue', 'sat', 'val', 'hue2', 'hue3', 'hue4', 'hue5', 'hue6', 'hue7', 'hue8', 'hue9', 'hue10', 'hue11', 'hue12', 'hue13', 'hue14', 'hue15', 'hue16', 'hue17', 'hue18', 'hue19', 'hue20', 'hue21', 'hue22', 'hue23', 'hue24', 'hue25', 'hue26', 'hue27', 'hue28', 'hue29', 'hue30', 'hue31', 'hue32', 'hue33', 'hue34', 'hue35', 'hue36', 'hue37', 'hue38', 'hue39', 'hue40', 'hue41', 'hue42', 'hue43', 'hue44', 'hue45', 'hue46', 'hue47', 'hue48', 'hue49', 'hue50', 'hue51', 'hue52', 'hue53', 'hue54', 'hue55', 'hue56', 'hue57', 'hue58', 'hue59', 'hue60', 'hue61', 'hue62', 'hue63', 'hue64', 'hue65', 'hue66', 'hue67', 'hue68', 'hue69', 'hue70', 'hue71', 'hue72', 'hue73', 'hue74', 'hue75', 'hue76', 'hue77', 'hue78', 'hue79', 'hue80', 'hue81', 'hue82', 'hue83', 'hue84', 'hue85', 'hue86', 'hue87', 'hue88', 'hue89', 'hue90', 'hue91', 'hue92', 'hue93', 'hue94', 'hue95', 'hue96', 'hue97', 'hue98', 'hue99', 'hue100', 'hue101', 'hue102', 'hue103', 'hue104', 'hue105', 'hue106', 'hue107', 'hue108', 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