This document is written to describe the steps and the findings of my inferential statistics. The goal of using inferential statistics as part of my exploratory data analysis is to affirm the trends and analysis I've seen in the visualization of the data. By affirming this, we may be able assume that there is enough data given in the Spotify's feature analysis can be used to define a certain theme of a playlist. The various steps I took to develop my inferential statistics are below:

1. **Determine the inferential tests to be used on the data:** Since two different populations are being compared previously, performing hypothesis testing, specifically on the difference of means of the values of each feature between the different playlists would be appropriate. This would tell us if there is a statistical differences between the two playlists and which features those differences can be found.
2. **Combine multiple playlists together of same types in order to utilize a bigger sample size:** In statistical testing, more data is always better. This is done on the chosen datasets by combining playlists that have similar themes and labeling them appropriately (i.e. happy for happy themed playlists and sad for sad themed playlists). Also, by labeling each song in the playlist, it becomes easier to do the testing. Because the playlists are stored as a pandas dataframe, the joining of the playlists were done by done by using the DataFrame.append() method. Before combining the two different playlists together, each song was labeled by creating a new column in the dataframes and setting that value to the appropriate label.
3. **Determine if the requirements are met for the inferential tests:** This is an important step since if the tests don't satisfy the requirements (normality, independence, and randomness) of statistical testings, the conclusions of the results would not be totally accurate. With that being said, the data seemed to satisfy the requirements with a slight exception to randomness. The data might not be totally random as the songs for the playlists were chosen by a curator, making it subjective and containing bias. However this exception was deemed acceptable as it is this subjectivity that leads to the different themes of the playlists. Also, sampling for the bootstrap testing is done randomly for each playlist which can mitigate the bias.
4. **Set-up and perform inferential tests on the data:** The null hypothesis of the inferential test is that there is no difference between the mean values of the features of the playlists with an alpha value of 0.001. The tests were performed via bootstrap methods that are defined in the code.
5. **Analyze the results of the inferential tests:** Print out the results and determine if the tests affirm that there differences between the two themes.

The results of the testing are as follows:

Feature	*P-value*
Acousticness	**0.0**
Danceability	**0.0**

Energy	**0.0**
Instrumentalness	0.7377
Liveness	**0.0**
Loudness	**0.0**
Speechiness	0.021
Valence	**0.0**
Tempo	0.0474
Popularity	0.0294
Major/Minor	0.9784
Explicitness	0.0271

The features that are bolded are features that were found to have significant differences between the two playlists. Unsurprisingly, these are the same features that can be seen to have visual differences in the visualization of the data. The results affirm that there are differences in the playlists which suggests that differently themed playlists can be differentiated by the features above.