In [1]:
```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import scipy.stats as stats
import statsmodels.api as sm
import statsmodels.formula.api as smf
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.neighbors import KNeighborsClassifier
from sklearn import metrics
```

Predicting Market Value Using Linear Regression

In [2]:
```python
## Download the dataset GlenCove
```

In [3]:
```python
## Upload the dataset using pandas
```

In [4]:
```python
glen_file = 'C:\\Users\\Joey\\Documents\\GlenCove.xlsx'
GlenCove = pd.read_excel(glen_file)
```

In [5]:
```python
## View the first 10 rows of the data using the head method
```

In [6]:
```python
print(GlenCove.head(n=10))
```

```
                Address  Fair Market Value($000)  Property Size (acres)  Age  \
0       9 Sycamore Road                    522.9                 0.2297   56
1       21 Jefferson St                    425.0                 0.2192   61
2  38 Hitching Post Lane                   539.2                 0.1630   39
3           4 Poppy Lane                   628.2                 0.4608   28
4         5 Daniel Drive                   490.4                 0.2549   56
5     15 Francis Terrace                   487.7                 0.2290   98
6      23 Guilfoy Street                   370.3                 0.1808   58
7      17 Carlyle Drive                    777.9                 0.5015   17
8        8 Craft Avenue                    347.1                 0.2229   62
9      22 Beechwood Ct.                    756.8                 0.1300   25

   House Size (square feet)  Rooms  Baths  Garage
0                      2448      7    3.5       2
1                      1942      7    2.5       1
2                      2073      5    3.0       2
3                      2707      8    2.5       1
4                      2042      7    1.5       1
5                      2089      7    2.0       0
6                      1433      7    2.0       0
7                      2991      9    2.5       1
8                      1008      5    1.0       0
9                      3202      8    2.5       2
```

In [7]:
```python
## Rename the columns
```

In [8]:
```python
GlenCove = GlenCove.rename(columns={'Fair Market Value($000)':'fair_market_value', 'Property Size (acres)':'pro
```

In [9]:
```python
## Recode garage values as binary and remove the age column
```

In [10]:
```python
garage_dummies = pd.get_dummies(GlenCove['Garage']).iloc[:, 1:]
garage_dummies = garage_dummies[1] + garage_dummies[2]
GlenCove_final = GlenCove.drop('Age', 1)
GlenCove_final['Garage'] = garage_dummies
GlenCove_final.head(n=10)
```

Out[10]:

	Address	fair_market_value	property_size	house_size	Rooms	Baths	Garage
0	9 Sycamore Road	522.9	0.2297	2448	7	3.5	1
1	21 Jefferson St	425.0	0.2192	1942	7	2.5	1
2	38 Hitching Post Lane	539.2	0.1630	2073	5	3.0	1
3	4 Poppy Lane	628.2	0.4608	2707	8	2.5	1
4	5 Daniel Drive	490.4	0.2549	2042	7	1.5	1
5	15 Francis Terrace	487.7	0.2290	2089	7	2.0	0
6	23 Guilfoy Street	370.3	0.1808	1433	7	2.0	0
7	17 Carlyle Drive	777.9	0.5015	2991	9	2.5	1
8	8 Craft Avenue	347.1	0.2229	1008	5	1.0	0
9	22 Beechwood Ct.	756.8	0.1300	3202	8	2.5	1

In [11]:
```python
## Print the summary statistics for all the numerical columns
```

In [12]:
```python
GlenCove_numeric = GlenCove_final[['fair_market_value', 'property_size', 'house_size', 'Rooms', 'Baths']]
GlenCove_sum = GlenCove_numeric.describe()
print(GlenCove_sum)
```

```
       fair_market_value  property_size   house_size      Rooms      Baths
count          30.000000      30.000000    30.000000  30.000000  30.000000
mean          474.910000       0.275960  1978.833333   6.833333   2.000000
std           144.312669       0.236445   550.875234   1.487496   0.694808
min           310.200000       0.085200  1008.000000   5.000000   1.000000
25%           374.675000       0.152650  1622.250000   6.000000   1.625000
50%           431.200000       0.204050  1992.000000   7.000000   2.000000
75%           535.125000       0.270350  2205.500000   7.750000   2.500000
max           889.000000       1.310000  3202.000000  11.000000   3.500000
```

In [13]:
```python
### Print the correlation matrix for property_size, house_size, Rooms, and Baths
```

In [14]:
```python
print(GlenCove_final[['property_size','house_size','Rooms','Baths']].corr())
```

```
               property_size  house_size     Rooms     Baths
property_size       1.000000    0.211664  0.052963  0.053408
house_size          0.211664    1.000000  0.399573  0.521314
Rooms               0.052963    0.399573  1.000000  0.133457
Baths               0.053408    0.521314  0.133457  1.000000
```

In [15]:
```python
## Type out the direction and strength of the correlation between
## each pair of variables in your matrix
```

In [16]:
```python
## Property Size:
## weak positive correlations with house_size, Rooms, and Baths

## House Size:
## weak positive correlations with property_size and Rooms,
## moderate positive correlation with Baths

## Rooms:
## weak positive correlations with property_size, house_size, and Baths

## Baths:
## weak positive correlations with property_size and Rooms,
## moderate positive correlation with house_size
```

In [17]:
```python
## Using the statsmodels library, fit the data to a linear regression model
```

In [18]:
```python
results = smf.ols('fair_market_value ~ property_size + house_size + Rooms + Baths + Garage', data = GlenCove_fi
```

In [19]:
```python
## Print the regression results summary
```

In [20]:
```python
print(results.summary())
```

```
                            OLS Regression Results
==============================================================================
Dep. Variable:      fair_market_value   R-squared:                       0.815
Model:                            OLS   Adj. R-squared:                  0.776
Method:                 Least Squares   F-statistic:                     21.09
Date:                Tue, 18 May 2021   Prob (F-statistic):           4.52e-08
Time:                        01:46:51   Log-Likelihood:                -165.94
No. Observations:                  30   AIC:                             343.9
Df Residuals:                      24   BIC:                             352.3
Df Model:                           5
Covariance Type:            nonrobust
=================================================================================
                    coef    std err          t      P>|t|      [0.025      0.975]
---------------------------------------------------------------------------------
Intercept        78.0523     67.779      1.152      0.261     -61.837     217.942
property_size   359.3104     56.919      6.313      0.000     241.836     476.785
house_size        0.1025      0.033      3.117      0.005       0.035       0.170
Rooms             0.7385      9.667      0.076      0.940     -19.214      20.691
Baths            36.8445     21.904      1.682      0.106      -8.363      82.052
Garage           28.3802     31.716      0.895      0.380     -37.078      93.839
==============================================================================
Omnibus:                        4.370   Durbin-Watson:                   1.619
Prob(Omnibus):                  0.112   Jarque-Bera (JB):                2.767
Skew:                           0.569   Prob(JB):                        0.251
Kurtosis:                       3.958   Cond. No.                     1.15e+04
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 1.15e+04. This might indicate that there are
strong multicollinearity or other numerical problems.
```

In [21]:
```python
## Create and print an ANOVA table
```

In [22]:
```python
aov_table = sm.stats.anova_lm(results, typ=2)
print(aov_table)
```

```
                     sum_sq    df          F    PR(>F)
property_size  185956.980096   1.0  39.850226  0.000002
house_size      45335.829171   1.0   9.715382  0.004693
Rooms              27.229339   1.0   0.005835  0.939743
Baths           13203.326340   1.0   2.829448  0.105518
Garage           3736.437085   1.0   0.800711  0.379768
Residual       111993.529961  24.0        NaN       NaN
```

In [23]:
```python
## Explain whether or not you think this is a good model and why.
## You must use at least 2 measurements from your model to explain.
```

In [24]:
```python
## I believe this is a decent model. According to the R-squared value, the model accounts for about 82% of
## the variability in fair_market_value, and the p-value for the F-statistic is close to 0, indicating that
##the results are likely significant. However, when looking through the p-values for each independent
## variable,it seems that only two (property_size and house_size) are significant, and it may be worthwile
## to consider removing these insignificant variables. (this is all assuming a significance level of 0.05)
```

In [25]:
```python
## Type out the regression equation with the coefficients from the model output
```

In [26]:
```python
## Y = 78.0523 + (359.3104)property_size + (0.1025)house_size + (0.7385)Rooms + (36.8445)Baths
## + (28.3802)Garage
```

In [27]:
```python
## Predict the fair market value of a house that is 2000 sqft, on 0.30 acres, with 6 rooms, 2 bathrooms, and
## a garage
```

In [28]:
```python
prediction =  results.predict(exog=dict(house_size = 2000, property_size = 0.30, Rooms = 6, Baths = 2, Garage =
prediction_string = prediction.to_string()
print(prediction_string[:11], "Thousand Dollars")
```

```
0    497.40 Thousand Dollars
```

Plotting the Distribution of NBA Franchise Values

In [29]:
```python
## Download the dataset NBAValues.xlsx
```

In [30]:
```python
## Upload the dataset into your jupyter notebook using pandas
```

In [31]:
```python
nba_file = 'C:\\Users\\Joey\\Documents\\NBAValues.xlsx'
nba = pd.read_excel(nba_file)
```

In [32]:
```python
## Display the entire dataframe without using the print function
```

In [33]:
```python
nba
```

Out[33]:

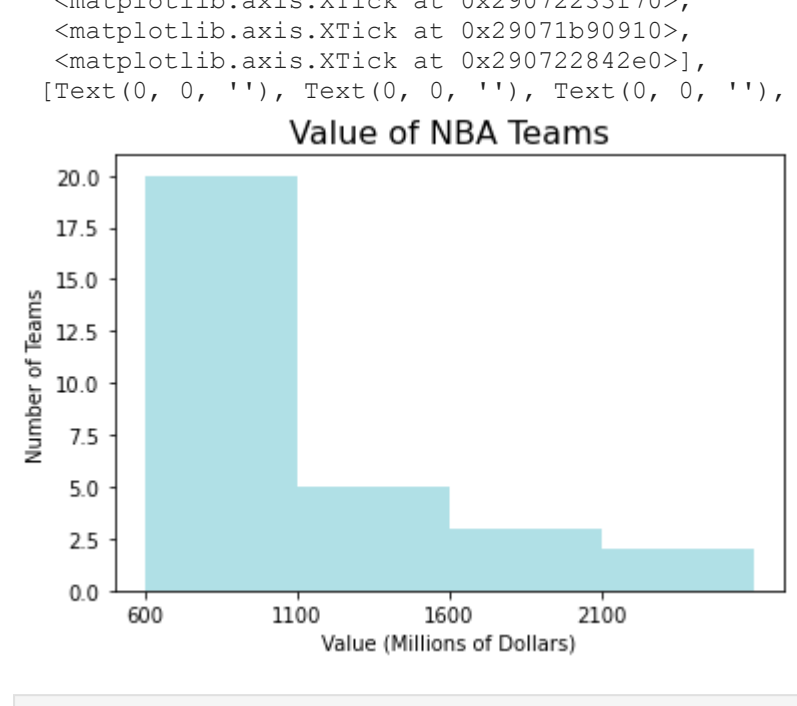
	Team Name	Team Code	Revenue ($mil)	Current Value ($mil)
0	Atlanta Hawks	ATL	133	825
1	Boston Celtics	BOS	173	1700
2	Brooklyn Nets	BKN	212	1500
3	Charlotte Bobcats	CHA	130	725
4	Chicago Bulls	CHI	201	2000
5	Cleveland Cavaliers	CLE	149	915
6	Dallas Mavericks	DAL	168	1150
7	Denver Nuggets	DEN	136	855
8	Detroit Pistons	DET	144	810
9	Golden State Warriors	GSW	168	1300
10	Houston Rockets	HOU	175	1250
11	Indiana Pacers	IND	149	830
12	Los Angeles Clippers	LAC	146	1600
13	Los Angeles Lakers	LAL	293	2600
14	Memphis Grizzlies	MEM	135	750
15	Miami Heat	MIA	188	1175
16	Milwaukee Bucks	MIL	110	600
17	Minnesota Timberwolves	MIN	128	625
18	New Orleans Pelicans	NOH	131	650
19	New York Knicks	NYK	278	2500
20	Oklahoma City Thunder	OKC	152	930
21	Orlando Magic	ORL	143	875
22	Philadelphia 76ers	PHI	125	700
23	Phoenix Suns	PHX	145	910
24	Portland Trail Blazers	POR	153	940
25	Sacramento Kings	SAC	125	800
26	San Antonio Spurs	SAS	174	1000
27	Toronto Raptors	TOR	151	920
28	Utah Jazz	UTA	142	830
29	Washington Wizards	WAS	143	900

In [34]:
```python
## Create at least 3 histograms of the Current Value column and change the number of bins and the color
## for each graph.
```

In [35]:
```python
## Each histogram should have an x-axis label, y-axis label, and title. The axis labels should have size
## 10 font and the title should be size 16.
```

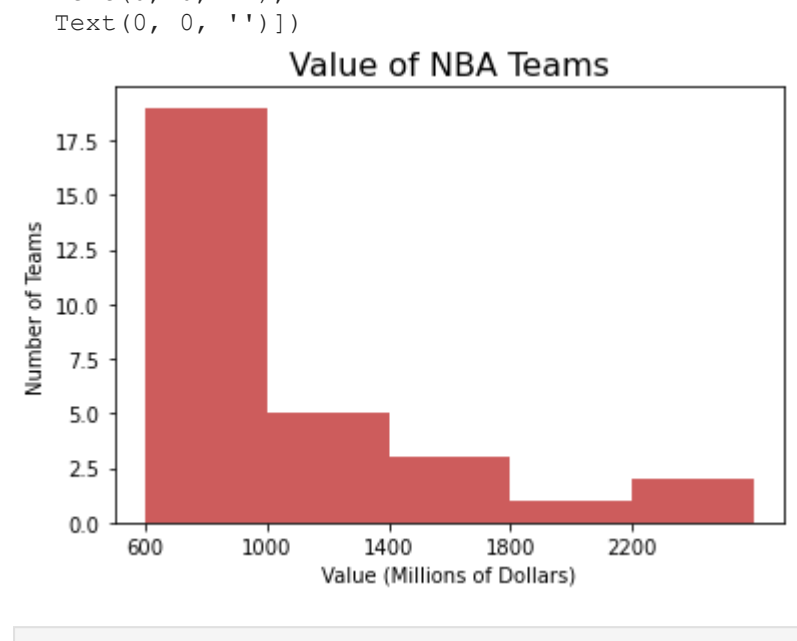
In [36]:
```python
fig, ax = plt.subplots()
plt.hist(nba['Current Value ($mil) '], bins = 4, color = 'powderblue')
plt.title('Value of NBA Teams', fontsize = 16)
ax.set_xlabel('Value (Millions of Dollars)', fontsize = 10)
ax.set_ylabel('Number of Teams', fontsize = 10)
plt.xticks(np.arange(600, 2550, 500))
```

Out[36]:
```
([<matplotlib.axis.XTick at 0x29072233fa0>,
  <matplotlib.axis.XTick at 0x29072233f70>,
  <matplotlib.axis.XTick at 0x29071b90910>,
  <matplotlib.axis.XTick at 0x290722842e0>],
 [Text(0, 0, ''), Text(0, 0, ''), Text(0, 0, ''), Text(0, 0, '')])
```



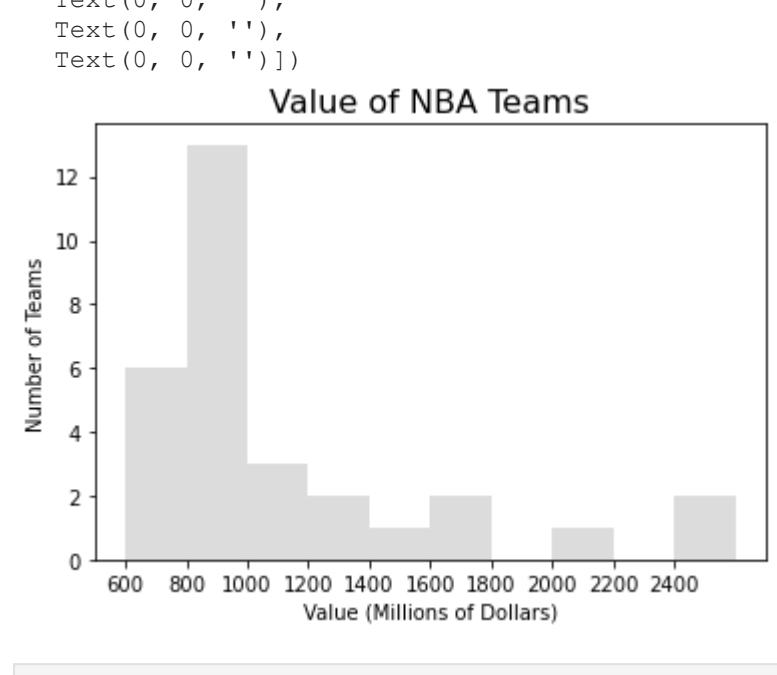
In [37]:
```python
fig, ax = plt.subplots()
plt.hist(nba['Current Value ($mil) '], bins = 5, color = 'indianred')
plt.title('Value of NBA Teams', fontsize = 16)
ax.set_xlabel('Value (Millions of Dollars)', fontsize = 10)
ax.set_ylabel('Number of Teams', fontsize = 10)
plt.xticks(np.arange(600, 2600, 400))
```

Out[37]:
```
([<matplotlib.axis.XTick at 0x29072305d60>,
  <matplotlib.axis.XTick at 0x29072305d30>,
  <matplotlib.axis.XTick at 0x290722fa9d0>,
  <matplotlib.axis.XTick at 0x2907233a370>,
  <matplotlib.axis.XTick at 0x2907233a880>],
 [Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, '')])
```



In [38]:
```python
fig, ax = plt.subplots()
plt.hist(nba['Current Value ($mil) '], bins = 10, color = 'gainsboro')
plt.title('Value of NBA Teams', fontsize = 16)
ax.set_xlabel('Value (Millions of Dollars)', fontsize = 10)
ax.set_ylabel('Number of Teams', fontsize = 10)
plt.xticks(np.arange(600, 2600, 200))
```

Out[38]:
```
([<matplotlib.axis.XTick at 0x2907236d4c0>,
  <matplotlib.axis.XTick at 0x2907236d490>,
  <matplotlib.axis.XTick at 0x29072367490>,
  <matplotlib.axis.XTick at 0x290723aa8b0>,
  <matplotlib.axis.XTick at 0x290723aadc0>,
  <matplotlib.axis.XTick at 0x290723b3310>,
  <matplotlib.axis.XTick at 0x290723b3820>,
  <matplotlib.axis.XTick at 0x290723b3d30>,
  <matplotlib.axis.XTick at 0x290723bb280>,
  <matplotlib.axis.XTick at 0x290723bb790>],
 [Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, '')])
```



In [39]:
```python
## Specify what you think is the best number of bins for this dataset
```

In [40]:
```python
## The best number of bins is 5 as it limits the number of white space while also providing a smooth
## and detailed distribution curve.
```

In [41]:
```python
## Describe the shape of the distribution (e.g. normal, bimodal, right-skewed, left-skewed, etc.)
```

In [42]:
```python
## This is a right-skewed distribution as the right side (tail) is longer than the left side.
```

Plotting the Distribution of MLB Franchise Values

In [43]:
```python
## Download the dataset baseball_values.csv
```

In [44]:
```python
## Upload the dataset using pandas
```

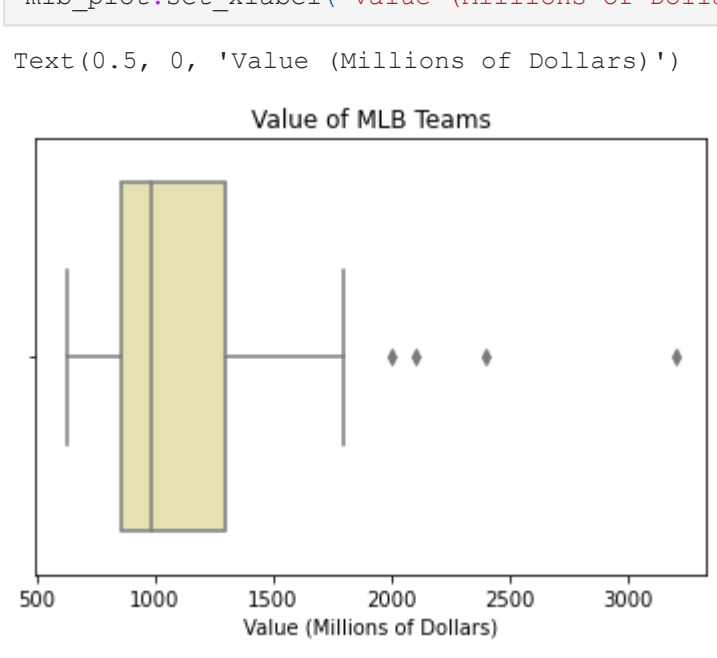
In [45]:
```python
mlb_file = 'C:\\Users\\Joey\\Documents\\baseball_values.csv'
mlb = pd.read_csv(mlb_file)
```

In [46]:
```python
## Create a boxplot of the value column. Include an x-axis label, title, and change the color
print(mlb)
```

```
                   Team  Revenue  Value
0             Baltimore      245   1000
1                Boston      370   2100
2     Chicago White Sox      227    975
3             Cleveland      207    825
4               Detroit      254   1125
5               Houston      175    800
6           Kansas City      231    700
7    Los Angeles Angels      304   1300
8             Minnesota      223    895
9      New York Yankees      508   3200
10              Oakland      202    725
11              Seattle      250   1100
12            Tampa Bay      188    625
13                Texas      266   1220
14              Toronto      226    870
15              Arizona      211    840
16              Atlanta      267   1150
17         Chicago Cubs      302   1800
18           Cincinnati      227    885
19             Colorado      214    855
20  Los Angeles Dodgers      403   2400
21                Miami      188    650
22            Milwaukee      226    875
23        New York Mets      263   1350
24         Philadelphia      265   1250
25           Pittsburgh      229    900
26            St. Louis      294   1400
27            San Diego      225    890
28        San Francisco      387   2000
29           Washington      287   1280
```

In [47]:
```python
mlb_plot = sns.boxplot(x = 'Value', data = mlb, color = 'palegoldenrod')
mlb_plot.set_title('Value of MLB Teams')
mlb_plot.set_xlabel('Value (Millions of Dollars)')
```

Out[47]:
```
Text(0.5, 0, 'Value (Millions of Dollars)')
```

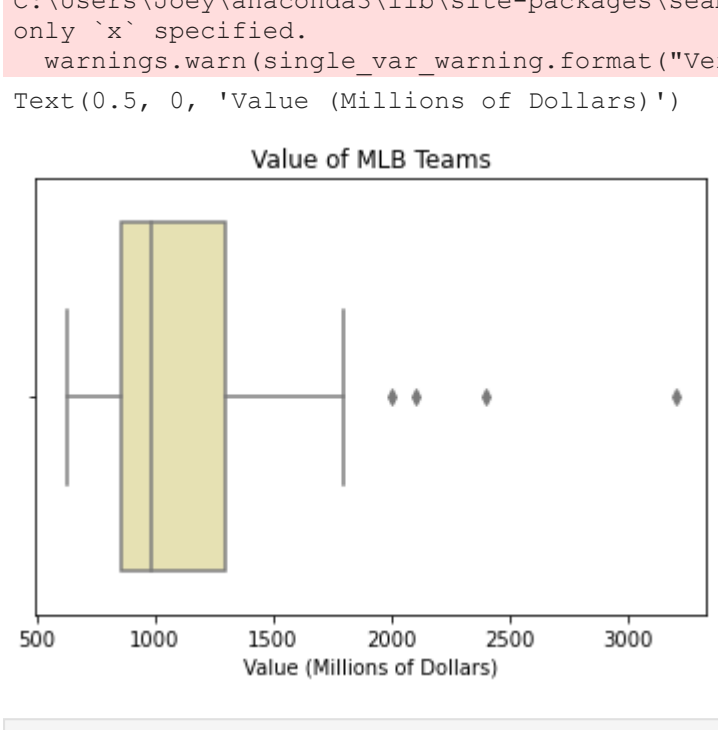


In [48]:
```python
## Change the orientation of the boxplot so it is displayed vertically instead of horizontally.
## (seaborn has since changed syntax for vertical boxplots, need to check documentation to fix)
```

In [49]:
```python
mlb_plot = sns.boxplot(x = 'Value', data = mlb, color = 'palegoldenrod', orient = 'v')
mlb_plot.set_title('Value of MLB Teams')
mlb_plot.set_xlabel('Value (Millions of Dollars)')
```

```
C:\Users\Joey\anaconda3\lib\site-packages\seaborn\_core.py:1303: UserWarning: Vertical orientation ignored with
only `x` specified.
  warnings.warn(single_var_warning.format("Vertical", "x"))
```

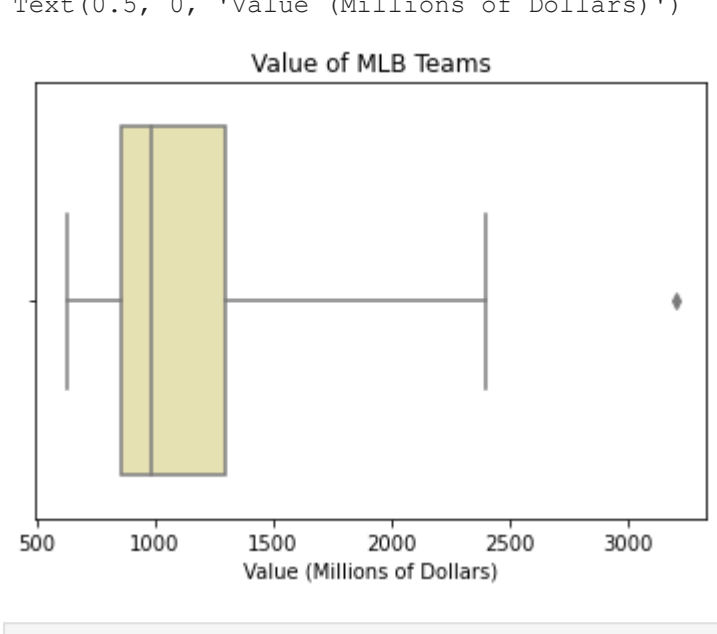
Out[49]:
```
Text(0.5, 0, 'Value (Millions of Dollars)')
```



In [50]:
```python
## Adjust an optional argument so that the whiskers extend 3X the IQR
```

In [51]:
```python
mlb_plot = sns.boxplot(x = 'Value', data = mlb, color = 'palegoldenrod', whis = 3)
mlb_plot.set_title('Value of MLB Teams')
mlb_plot.set_xlabel('Value (Millions of Dollars)')
```

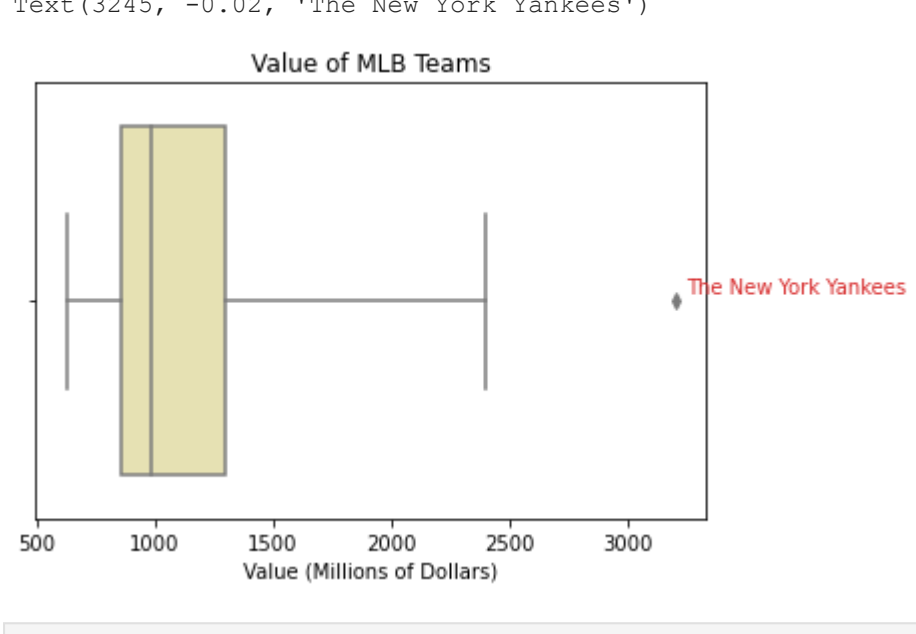
Out[51]:
```
Text(0.5, 0, 'Value (Millions of Dollars)')
```



In [52]:
```python
## Label the outlier with the team name displayed in red above the point
```

In [53]:
```python
mlb_plot = sns.boxplot(x = 'Value', data = mlb, color = 'palegoldenrod', whis = 3)
mlb_plot.set_title('Value of MLB Teams')
mlb_plot.set_xlabel('Value (Millions of Dollars)')
mlb_plot.text(x = 3245, y = -.02, s = 'The New York Yankees', color = 'tab:red')
```

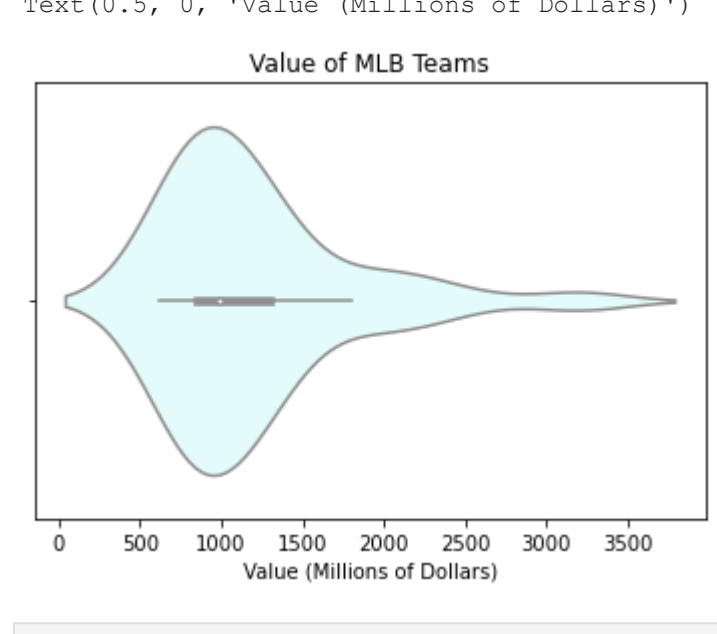
Out[53]:
```
Text(3245, -0.02, 'The New York Yankees')
```



In [54]:
```python
## Create a violin plot of the value column. Include a title and x-axis label.
```

In [55]:
```python
mlb_violin = sns.violinplot(x = 'Value', data = mlb, color = 'lightcyan')
mlb_violin.set_title('Value of MLB Teams')
mlb_violin.set_xlabel('Value (Millions of Dollars)')
```

Out[55]:
```
Text(0.5, 0, 'Value (Millions of Dollars)')
```



In [56]:
```python
## Type the approximate mode of the dataset
```

In [57]:
```python
## The approximate mode is 990
```

Using k-NN to Classify Types of Fruit

In [58]:
```python
## Download the dataset fruit.tsv
```

In [59]:
```python
## Upload the dataset using a pandas function that can read in tabular
## separated values
```

In [60]:
```python
fruit_file = 'C:\\Users\\Joey\\Documents\\fruit.tsv'
fruit = pd.read_table(fruit_file)
```

In [61]:
```python
## Display the first 5 rows of the data
```

In [62]:
```python
fruit.head()
```

Out[62]:

	fruit_label	fruit_name	fruit_subtype	mass	width	height	color_score
0	1	apple	granny_smith	192	8.4	7.3	0.55
1	1	apple	granny_smith	180	8.0	6.8	0.59
2	1	apple	granny_smith	176	7.4	7.2	0.60
3	2	mandarin	mandarin	86	6.2	4.7	0.80
4	2	mandarin	mandarin	84	6.0	4.6	0.79

In [63]:
```python
## Determine how many observations of each fruit are contained in the dataset
```

In [64]:
```python
num_apple = (fruit.fruit_label == 1).sum()
num_mandarin = (fruit.fruit_label == 2).sum()
num_orange = (fruit.fruit_label == 3).sum()
num_lemon = (fruit.fruit_label == 4).sum()
```

In [65]:
```python
print(num_apple, 'apples,', num_mandarin, 'mandarins,', num_orange, 'oranges,', num_lemon, 'lemons')
```

```
19 apples, 5 mandarins, 19 oranges, 16 lemons
```

In [66]:
```python
## Subset the dataframe and create a new dataframe with just the columns 'fruit_name', 'mass','width',
## 'height', and 'color_score'
```

In [67]:
```python
fruit_final = fruit[['fruit_name', 'mass', 'width', 'height', 'color_score']]
```

In [68]:
```python
fruit_final.head()
```

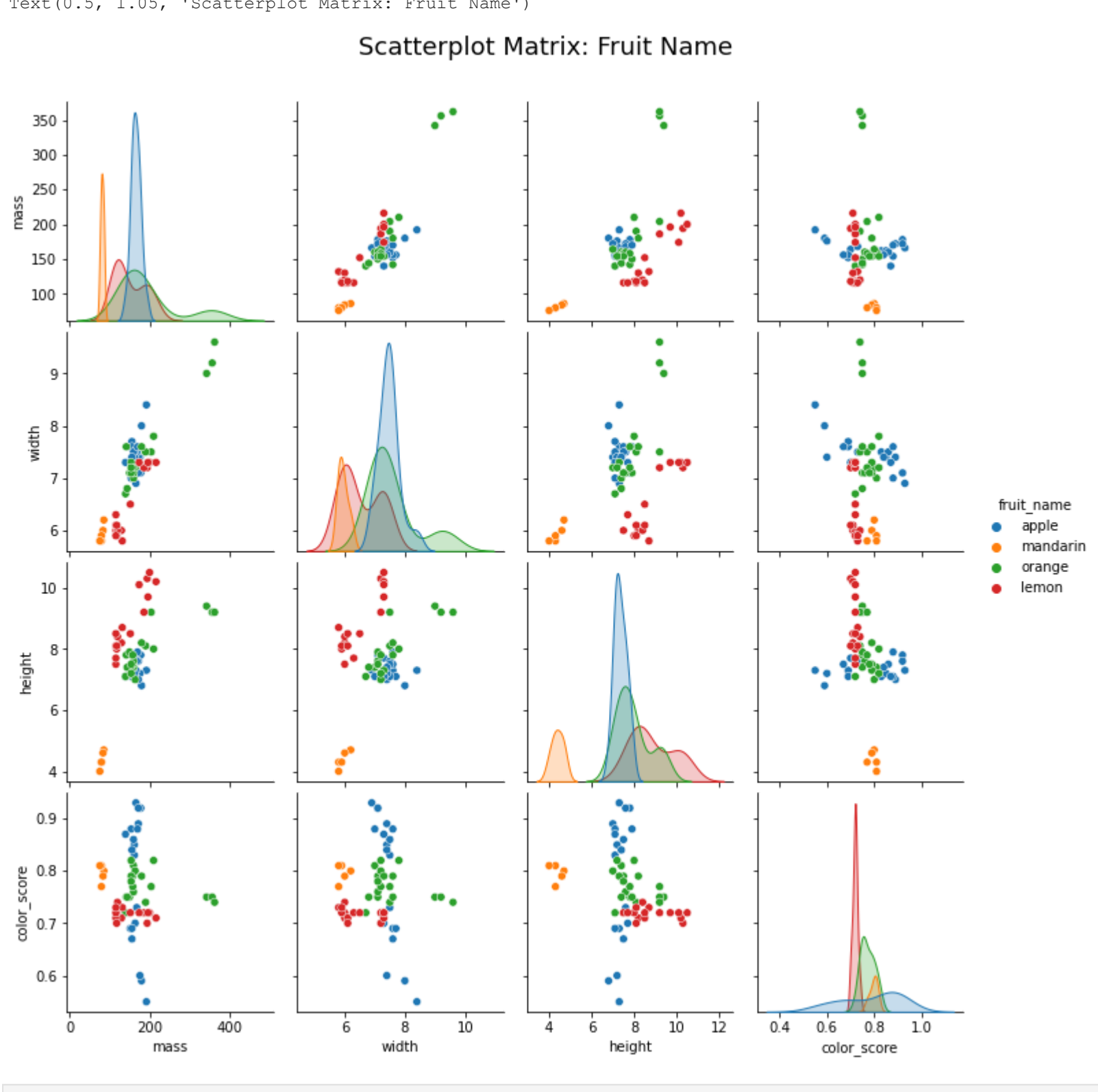
Out[68]:

	fruit_name	mass	width	height	color_score
0	apple	192	8.4	7.3	0.55
1	apple	180	8.0	6.8	0.59
2	apple	176	7.4	7.2	0.60
3	mandarin	86	6.2	4.7	0.80
4	mandarin	84	6.0	4.6	0.79

In [69]:
```python
## Create a scatterplot matrix using the new dataframe and color the dots based on fruit name.
## (Be sure to include title and legend)
```

In [70]:
```python
fruit_matrix = sns.pairplot(fruit_final, hue = 'fruit_name')
fruit_matrix.fig.suptitle("Scatterplot Matrix: Fruit Name", y = 1.05, fontsize = 18)
```

Out[70]:
```
Text(0.5, 1.05, 'Scatterplot Matrix: Fruit Name')
```



In [71]:
```python
## From the scatterplot matrix determine whether or not you think mass and height would be could predictor
## variables for the fruit name and leave your answer in a brief comment or markdown cell
```

In [72]:
```python
## I do not think that mass and height would be good predictor variables, as it seems as though there is a lot
## of overlap in the different types of fruit near the middle of the distribution.
```

In [73]:
```python
## Assign fruit_name as your dependent variable and the rest of the variables in your new dataframe as your
## independent variable
```

In [74]:
```python
x = fruit_final.iloc[:, 1:4].values
y = fruit_final.iloc[:, 0].values
```

In [75]:
```python
## Split the data into training and test splits (70% for training and 30% for testing). Set the random state
## to 0.
```

In [76]:
```python
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.3, random_state = 0)
```

In [77]:
```python
## Print out the summary statistics for the independent variables in your training set
```

In [78]:
```python
print(pd.DataFrame(x_train).describe())
```

```
                0          1          2
count   41.000000  41.000000  41.000000
mean   160.878049   7.058537   7.682927
std     53.607926   0.842608   1.236710
min     80.000000   5.800000   4.300000
25%    130.000000   6.200000   7.300000
50%    158.000000   7.200000   7.600000
75%    172.000000   7.500000   8.200000
max    356.000000   9.200000  10.500000
```

In [79]:
```python
## Print out the summary statistics for the independent variables in your test set
```

In [80]:
```python
print(pd.DataFrame(x_test).describe())
```

```
                0          1          2
count   18.000000  18.000000  18.000000
mean   168.222222   7.211111   7.716667
std     59.380682   0.767646   1.649331
min     76.000000   5.800000   4.000000
25%    144.000000   7.100000   7.200000
50%    162.000000   7.200000   7.550000
75%    179.000000   7.375000   8.175000
max    362.000000   9.600000  10.300000
```

In [81]:
```python
## Create a K-NN classifier model with 5NN
classifier = KNeighborsClassifier(n_neighbors=5, )
```

In [82]:
```python
## Standardize data (if necessary)
## scaler = StandardScaler()
## scaler.fit(x_train)
## x_train = scaler.transform(x_train)
## x_test = scaler.transform(x_test)
```

In [83]:
```python
## Initialize the classifier
classifier.fit(x_train, y_train)
```

Out[83]:
```
KNeighborsClassifier()
```

In [84]:
```python
## Use your test set to make predictions
```

In [85]:
```python
y_pred = classifier.predict(x_test)
y_pred
```

Out[85]:
```
array(['orange', 'apple', 'lemon', 'lemon', 'apple', 'apple', 'lemon',
       'lemon', 'apple', 'lemon', 'mandarin', 'apple', 'orange', 'apple',
       'lemon', 'apple', 'apple', 'mandarin'], dtype=object)
```

In [86]:
```python
## Print confusion matrix
```

In [87]:
```python
conf = metrics.confusion_matrix(y_test, y_pred)
print(conf)
```

```
[[3 1 0 0]
 [1 2 0 0]
 [0 0 2 0]
 [4 3 0 2]]
```

In [88]:
```python
## Print the model accuracy rate
```

In [89]:
```python
metrics.accuracy_score(y_test, y_pred)
```

Out[89]:
```
0.5
```

In [ ]: