In [1]:

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#HW3- Data fitting with Piecewise
# 0. Import the necessary libraries
# ----------------------------------------------------------------------
import numpy as np
import pandas as pd
import scipy.stats as sts
import matplotlib.pyplot as plt
import scipy.optimize as opt # minimizing procedure
from scipy.interpolate import*
import matplotlib
from mpl_toolkits.mplot3d import Axes3D
from matplotlib import cm
#1)Importing Libraries
import matplotlib.pyplot as plt #for plotting. Aliasing matplotlib.pyplot as 'plt'.
import numpy as np #for creating array. Aliasing numpy as 'np'.
from scipy.optimize import curve_fit as cf

#to plot within notebook
import matplotlib.pyplot as plt
# Fitting Polynomial Regression to the dataset

# ----------------------------------------------------------------------
# 1. Load data
# ----------------------------------------------------------------------
# Display settings
# read csv data
df = pd.read_csv('C:/Users/saeid/OneDrive/Documents/claremont/466/Projrct 1/TSLA.csv')
print (df.columns)

#2.to plot within notebook
import matplotlib.pyplot as plt
y = np.asarray(df['High'])
x = np.asarray(df.index.values)
plt.plot(x,y,label='Tesla''b-')
plt.xlabel('Days')
plt.ylabel('Tesla value')
plt.title('Data Fitting (polynomial and MLE)')
plt.legend()

#3.Piecewise curvefit
# 3.1. Creating Fucntions for the fit
def poly1(t,A,B):
   return A*t + B
def poly2(t,A,B,C):
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    return A*pow(t,2) + B*t + C
def poly3(t,A,B,C,D):
    return A*pow(t,3) + B*pow(t,2)+ C*t+D
def poly4(t,A,B,C,D,E):
    return A*pow(t,4) + B*pow(t,3)+ C*pow(t,2)+D*t+E
def expo(t,A,B,C):
    return A*np.exp(-B*t) + C

# 4.Splitting the data into ranges
# 4.1) Part1 days=x= 1-9
function1=poly2             #calls on the desired function
x1_9=x[:9]             #uses only the first 9 days
y1_9=y[:9]
X1 = np.linspace(1,9,9) #creates a line space equal to the length
p1, p2 = cf(function1,x1_9,y1_9) #p1= popt and p2 = pcov
fit1_9 = function1(X1,*p1) #gives the estimated equation for the set values
print(*p1)

# 4.2) Part1 days=x= 10-28
function2=poly1
x10_28=x[10:28]
y10_28=y[10:28]
X2 = np.linspace(10,28,18)
p3, p4 = cf(function2,x10_28,y10_28)
fit10_28 = function2(X2,*p3)
print(*p3)
plt.plot(X2,fit10_28,'r', linewidth=3)
print(function2)

# 4.3) Part1 days=x= 29-99
function3=poly2
x29_99=x[29:99]
y29_99=y[29:99]
X3 = np.linspace(29,99,70)
p5, p6 = cf(function3,x29_99,y29_99)
fit29_99 = function3(X3,*p5)
print(*p5)
plt.plot(X3,fit29_99,'p', linewidth=3)

# 4.4) Part1 days=x= 100-108
function4=poly3
x100_108=x[100:108]
y100_108=y[100:108]
X4 = np.linspace(100,108,8)
p7, p8 = cf(function4,x100_108,y100_108)
fit100_108 = function4(X4,*p7)
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print(*p7)
plt.plot(X4,fit100_108,'y', linewidth=3)

# 4.5) Part1 days=x= 109_129
function5=poly1
x108_129=x[108:129]
y108_129=y[108:129]
X5 = np.linspace(108,129,21)
p9, p10 = cf(function5,x108_129,y108_129)
fit108_129 = function5(X5,*p9)
print(*p9)
plt.plot(X5,fit108_129,'r', linewidth=3)

# 4.6) Part1 days=x= 130_144
function6=poly1
x129_144=x[129:144]
y129_144=y[129:144]
X6 = np.linspace(129,144,15)
p11, p12 = cf(function6,x129_144,y129_144)
fit129_144 = function6(X6,*p11)
print(*p11)
plt.plot(X6,fit129_144,'g', linewidth=3)

# 4.7) Part1 days=x= 144_148
function7=poly1
x144_148=x[144:148]
y144_148=y[144:148]
X7 = np.linspace(144,148,4)
p13, p14 = cf(function7,x144_148,y144_148)
fit144_148 = function7(X7,*p13)
print(*p13)
plt.plot(X7,fit144_148,'r', linewidth=3)

# 4.8) Part1 days=x= 148_153
function8=poly1
x148_153=x[148:153]
y148_153=y[148:153]
X8 = np.linspace(148,153,5)
p15, p16 = cf(function8,x148_153,y148_153)
fit148_153 = function8(X8,*p15)
print(*p15)
plt.plot(X8,fit148_153,'g', linewidth=3)

# 4.9) Part1 days=x= 153_159
function9=poly1
x153_159=x[153:159]
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y153_159=y[153:159]
X9 = np.linspace(153,159,7)
p17, p18 = cf(function9,x153_159,y153_159)
fit153_159 = function9(X9,*p17)
print(*p17)
plt.plot(X9,fit153_159,'p', linewidth=3)

# 4.10) Part1 days=x= 159_197
function10=poly2
x159_197=x[159:197]
y159_197=y[159:197]
X10 = np.linspace(159,197,38)
p19, p20 = cf(function10,x159_197,y159_197)
fit159_197 = function10(X10,*p19)
print(*p19)
plt.plot(X10,fit159_197,'p', linewidth=3)

# 4.11) Part1 days=x= 197_233
function11=poly3
x197_233=x[197:233]
y197_233=y[197:233]
X11 = np.linspace(197,233,36)
p21, p22 = cf(function11,x197_233,y197_233)
fit197_233 = function11(X11,*p21)
print(*p21)
plt.plot(X11,fit197_233,'y', linewidth=3)

# 4.12) Part1 days=x= 233_255
function12=poly1
x233_255=x[233:255]
y233_255=y[233:255]
X12 = np.linspace(233,255,22)
p23, p24 = cf(function12,x233_255,y233_255)
fit233_255 = function12(X12,*p23)
print(*p23)
plt.plot(X12,fit233_255,'r', linewidth=3)
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```
Index(['Days', 'High'], dtype='object')
0.4621362142845419 0.2981429523794178 154.7990053336688
-4.479093897844769 219.43957138816123
<function poly1 at 0x00000173FD251EE0>
-0.012129829719214946 3.0910465787184997 15.751965552924423
1.4314899974228572 -443.6487045992459 45833.60984573474 -1578142.174402922
-1.4201117108378918 476.3731842683047
12.64563563597672 -1311.0943127595006
-33.4700045000744 5296.780651511437
20.689000341642053 -2696.864052846308
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-6.388859400016174 1435.495972536471
-0.06824653390923419 23.96850548830884 -1664.5625592733772
0.030830162844376674 -19.799251579266265 4240.148911524772 -302176.5008679942
0.07404350423290185 845.6735899933658
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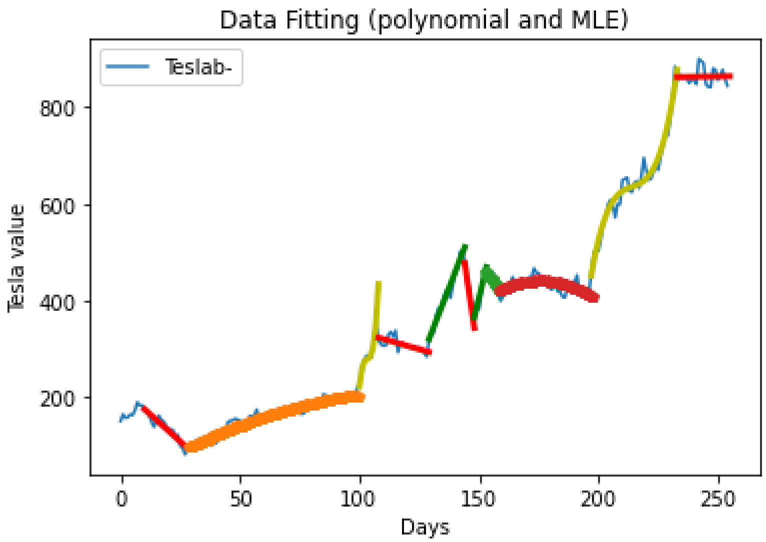
Out[1]: [<matplotlib.lines.Line2D at 0x173fd6976d0>]



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