```
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import pandas as pd


df1 = pd.read_csv("R-Channel.csv")
print(df1)
```

```
    Value[r]  輝度[Yr]  色度[xr]  色度[yr]
0          0     0.18    0.000    0.999
1         50     0.89    0.570    0.385
2         80     1.84    0.600    0.378
3        100     2.99    0.600    0.362
4        120     4.42    0.605    0.369
5        140     6.07    0.606    0.369
6        160     8.13    0.608    0.369
7        180    10.20    0.609    0.368
8        200    13.00    0.609    0.368
9        220    16.00    0.610    0.368
10       240    19.60    0.611    0.368
11       255    22.60    0.610    0.368
```

```
df1['r/255_log10'] = np.log10(df1['Value[r]']/255)
Yrmax=df1.iat[11, 1]
df1['Yr/Yrmax_log10'] = np.log10(df1['輝度[Yr]']/Yrmax)
df1
```

```
/usr/local/lib/python3.10/dist-packages/pandas/core/arraylike.py:402: RuntimeWarning: divide by zero encountered in log10
  result = getattr(ufunc, method)(*inputs, **kwargs)
```

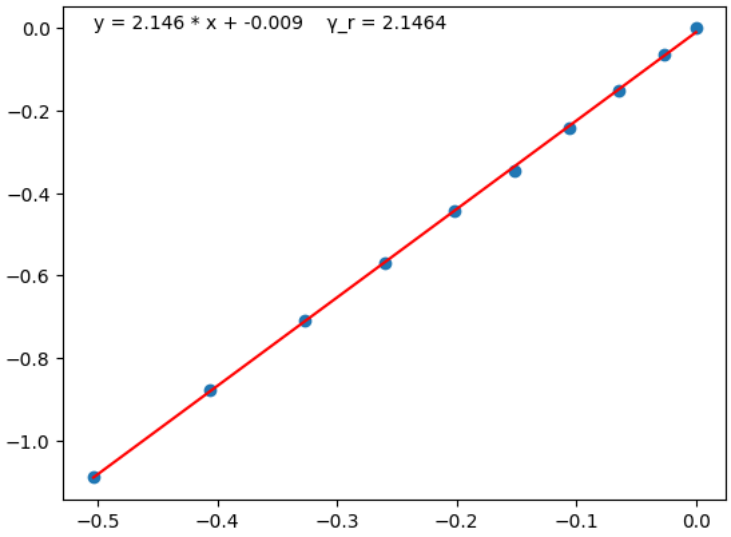
	Value[r]	輝度[Yr]	色度[xr]	色度[yr]	r/255_log10	Yr/Yrmax_log10
0	0	0.18	0.000	0.999	-inf	-2.098836
1	50	0.89	0.570	0.385	-0.707570	-1.404718
2	80	1.84	0.600	0.378	-0.503450	-1.089291
3	100	2.99	0.600	0.362	-0.406540	-0.878437
4	120	4.42	0.605	0.369	-0.327359	-0.708686
5	140	6.07	0.606	0.369	-0.260412	-0.570920
6	160	8.13	0.608	0.369	-0.202420	-0.444018
7	180	10.20	0.609	0.368	-0.151268	-0.345508
8	200	13.00	0.609	0.368	-0.105510	-0.240165
9	220	16.00	0.610	0.368	-0.064117	-0.149988
10	240	19.60	0.611	0.368	-0.026329	-0.061852
11	255	22.60	0.610	0.368	0.000000	0.000000

```
df2=df1.drop(0)
df2=df2.drop(1)
print(df2)
```

```
    Value[r]  輝度[Yr]  色度[xr]  色度[yr]  r/255_log10  Yr/Yrmax_log10
2         80     1.84    0.600    0.378    -0.503450       -1.089291
3        100     2.99    0.600    0.362    -0.406540       -0.878437
4        120     4.42    0.605    0.369    -0.327359       -0.708686
5        140     6.07    0.606    0.369    -0.260412       -0.570920
6        160     8.13    0.608    0.369    -0.202420       -0.444018
7        180    10.20    0.609    0.368    -0.151268       -0.345508
8        200    13.00    0.609    0.368    -0.105510       -0.240165
9        220    16.00    0.610    0.368    -0.064117       -0.149988
10       240    19.60    0.611    0.368    -0.026329       -0.061852
11       255    22.60    0.610    0.368     0.000000        0.000000
```

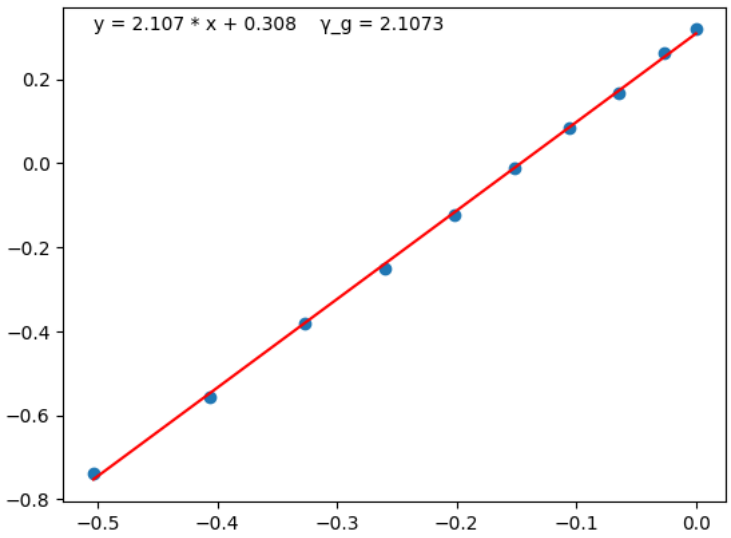
```
x = df2["r/255_log10"]
y = df2["Yr/Yrmax_log10"]

# Scatter plot
plt.scatter(x, y)

# Polynomial fit
coef = np.polyfit(x, y, 1)
poly1d_fn = np.poly1d(coef)

# Add the fitted line
plt.plot(x, poly1d_fn(x), 'r')
```

```
# Print the equation of the line
plt.text(min(x), max(y), 'y = ' + str(round(coef[0],3) )+ ' * x + ' + str(round(coef[1],3) )+'     γ_r = ' + str(round(coef[0],4) ))
plt.show()
```




```
df1 = pd.read_csv("G-Channel.csv")
df1['r/255_log10'] = np.log10(df1['Value[r]']/255)
Ymax=df1.iat[11, 1]
df1['Y/Ymax_log10'] = np.log10(df1['輝度[Y]']/Yrmax)
df2=df1.drop(0)
df2=df2.drop(1)
x = df2["r/255_log10"]
y = df2["Y/Ymax_log10"]
# Scatter plot
plt.scatter(x, y)
# Polynomial fit
coef = np.polyfit(x, y, 1)
poly1d_fn = np.poly1d(coef)
# Add the fitted line
plt.plot(x, poly1d_fn(x), 'r')
# Print the equation of the line
plt.text(min(x), max(y), 'y = ' + str(round(coef[0],3) )+ ' * x + ' + str(round(coef[1],3) )+'     γ_g = ' + str(round(coef[0],4) ))
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/pandas/core/arraylike.py:402: RuntimeWarning: divide by zero encountered in log10
  result = getattr(ufunc, method)(*inputs, **kwargs)
```




```
df1 = pd.read_csv("B-Channel.csv")
df1['r/255_log10'] = np.log10(df1['Value[r]']/255)
Ymax=df1.iat[11, 1]
df1['Y/Ymax_log10'] = np.log10(df1['輝度[Y]']/Yrmax)
df2=df1.drop(0)
df2=df2.drop(1)
x = df2["r/255_log10"]
y = df2["Y/Ymax_log10"]
# Scatter plot
plt.scatter(x, y)
```

```
# Polynomial fit
coef = np.polyfit(x, y, 1)
poly1d_fn = np.poly1d(coef)
# Add the fitted line
plt.plot(x, poly1d_fn(x), 'r')
# Print the equation of the line
plt.text(min(x), max(y), 'y = ' + str(round(coef[0],3) )+ ' * x + ' + str(round(coef[1],3) )+'     γ_b = ' + str(round(coef[0],4) ))
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/pandas/core/arraylike.py:402: RuntimeWarning: divide by zero encountered in log10
  result = getattr(ufunc, method)(*inputs, **kwargs)
```