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Analysis of L-star and “gamma “ TRC curves

Supplementary material, ver. 1.0

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This document describes analysis of L-star and common “gamma” TRC curves. The approach used to analyze TRC curves is based on polynomial or spline fit to data points of luminance (Y_n) vs. RGB_n relationship, followed by analysis of the fitted function. For each fitted curve, n-th derivative is calculated (which is still polynomial function) and the resulting function is plotted on the same RGB_n scale. When the same polynomial fit (I used 6th degree polynomial) is done on $\log Y_n$ vs. $\log RGB_n$ points, situation is very close to analyzing any log-log diagram. Since the log-log plot should be mostly linear (at least in highlights), the tangent line to it at any point gives the best linear approximation to our fit function. Hence the first derivative of the fit function would give us the slope of the linear portion of the fitted curve, i.e. the *gamma*. This is of course a simplification, though good enough to analyze genuine *gamma* and L-star curves.
Calculations and plots are generated by Matlab® code.

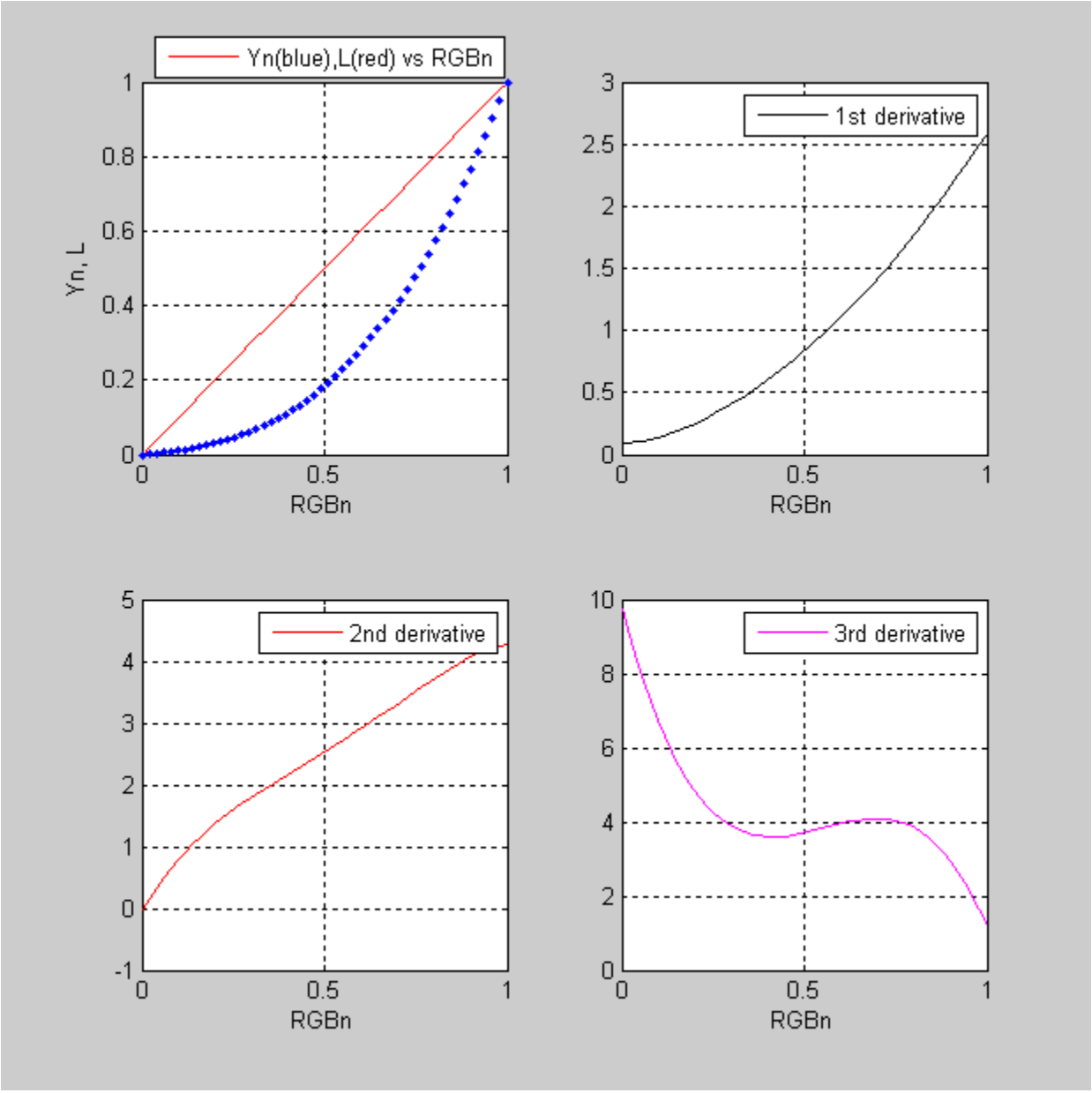
At this point I am planning on updating this document as new measurements become available. Please check the main webpage for the latest version.

List of abbreviations:

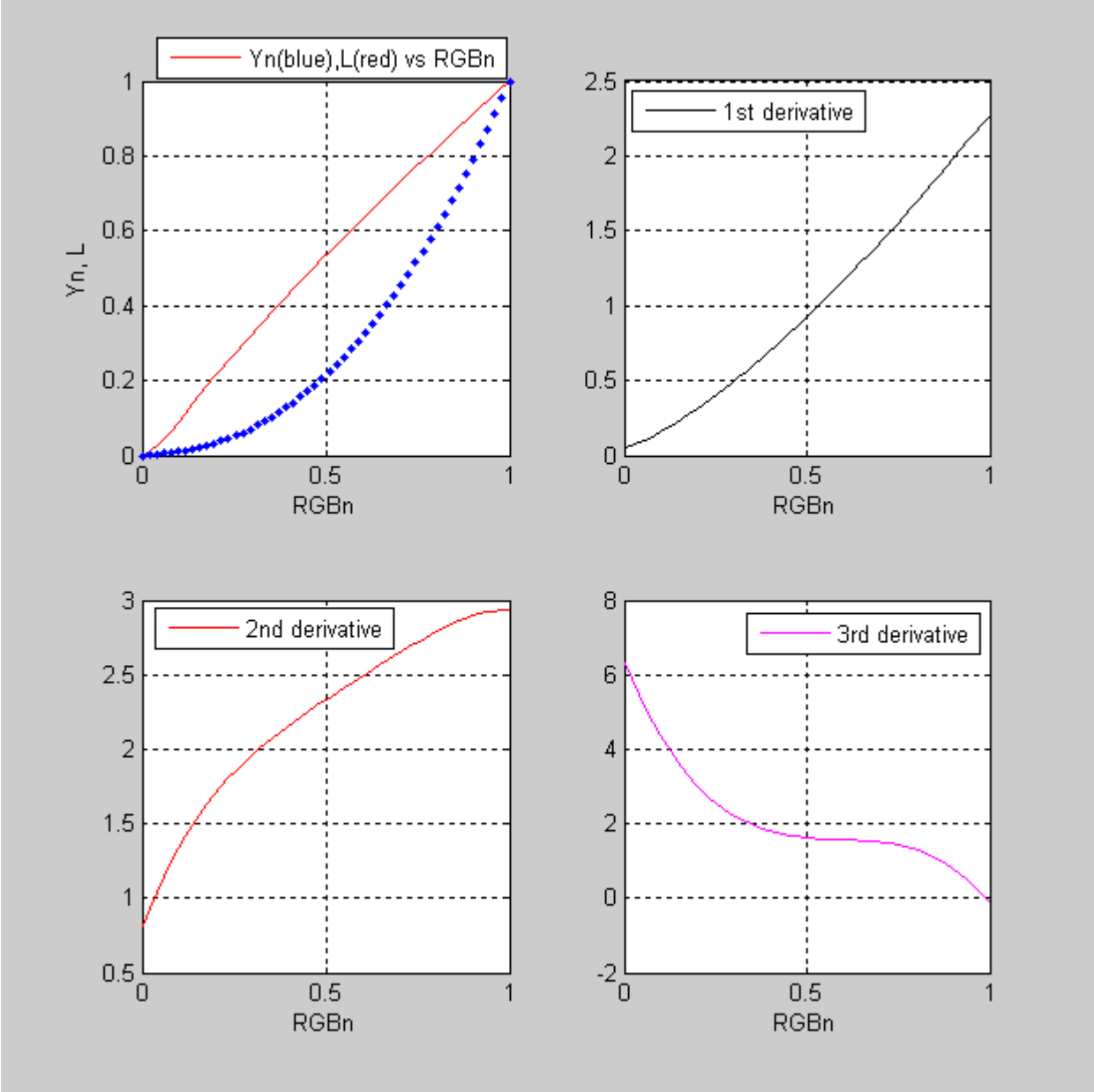
Y_n	Normalized relative luminance <0-1>
RGB_n	Normalized input RGB values for the gray ramp <0-1>
RGB	Input RGB values for the gray ramp <0-255>
*.txt	Input text file containing RGB (col1) and Y values (col2)
*.m	Matlab® file that analyzes the input data
lin	linear TRC curve
gamma	gamma TRC curve

Type: lin; output from the L-star.icc profile

data = load('L_Lstar_icm.txt'); g_eval_deriv_nolog.m

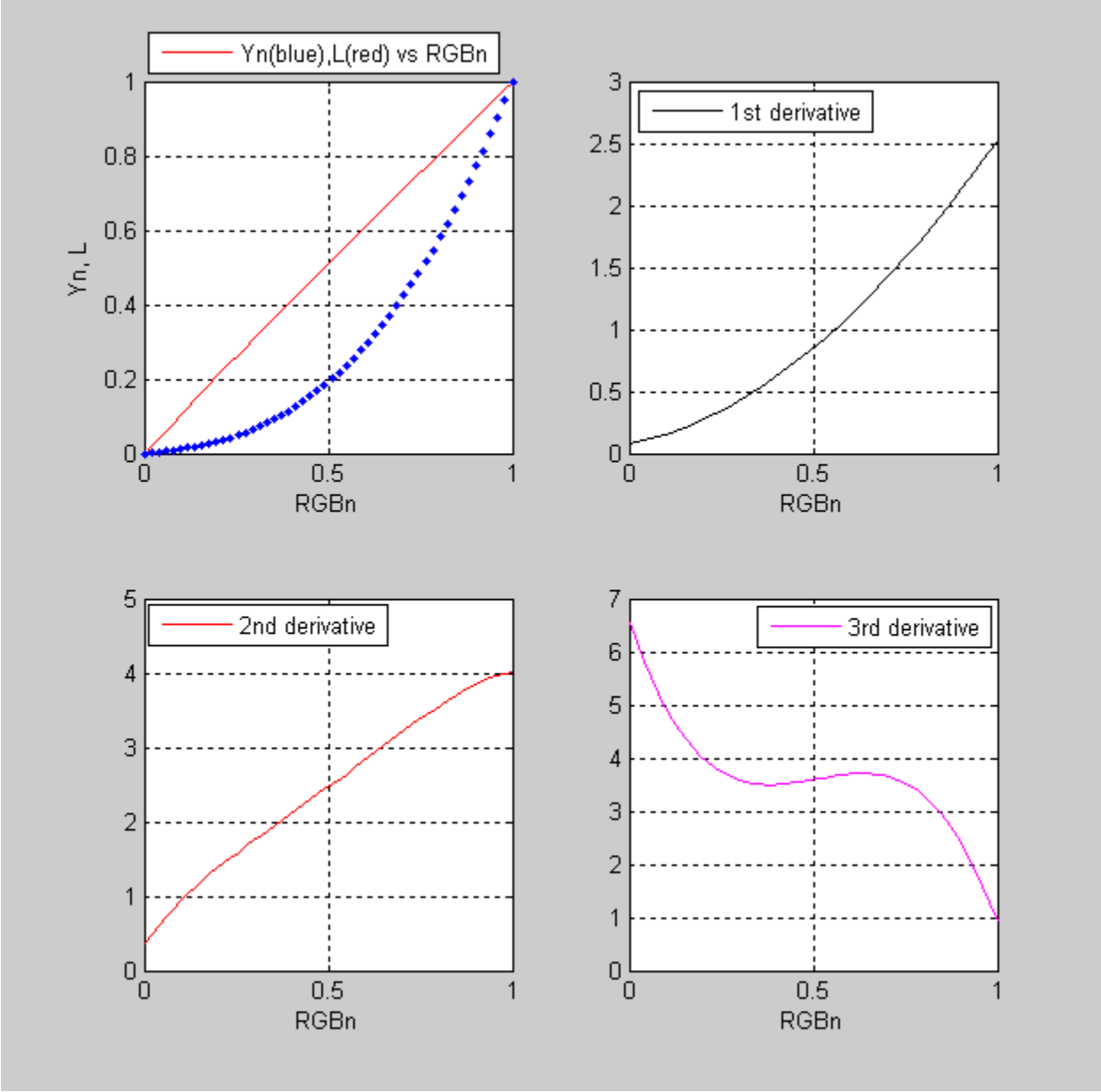


```
Type: gamma; output from the sRGB.icc profile
data = load('srgbY.txt'); g_eval_deriv_nolog.m
```



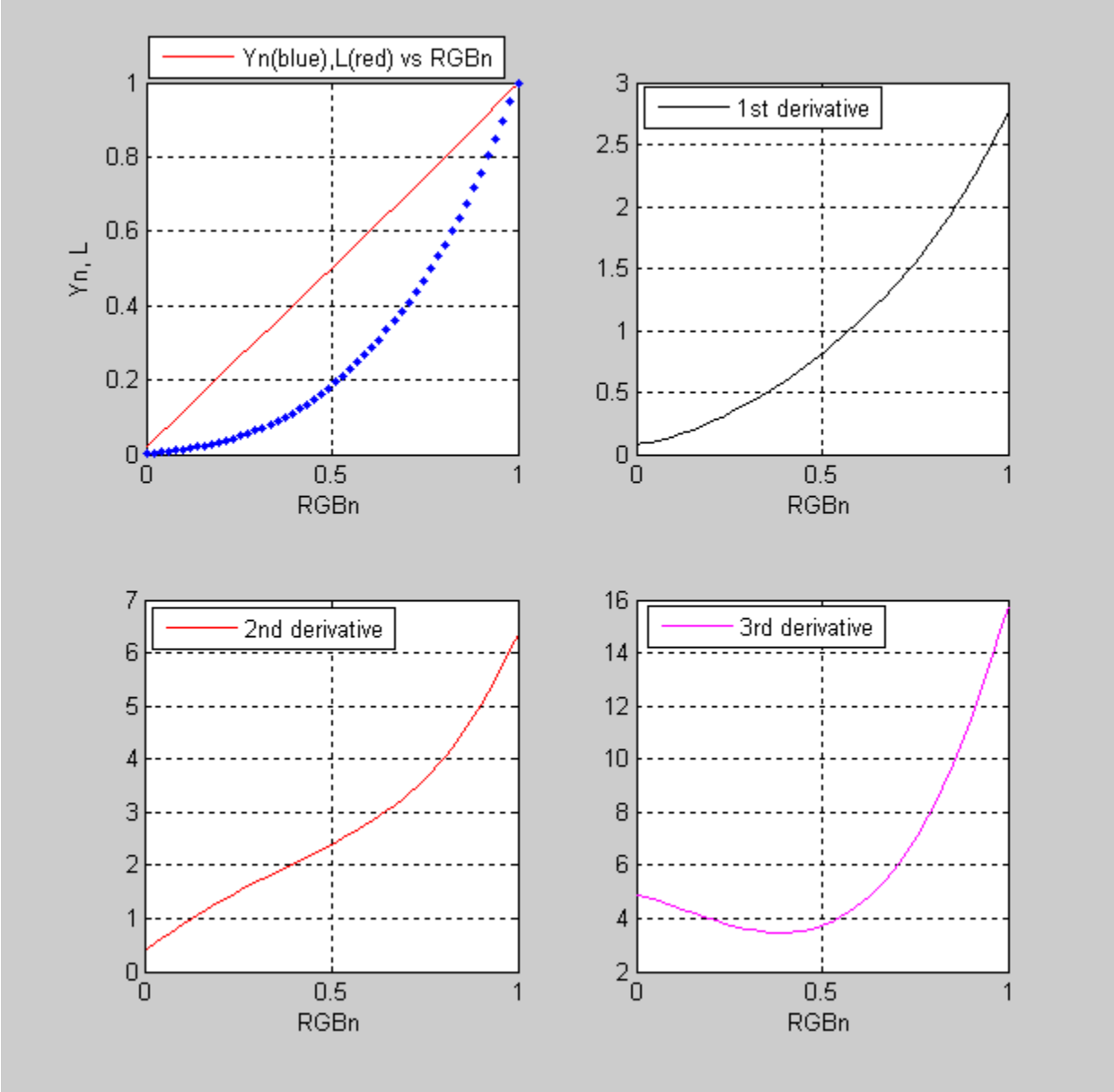
Type: lin; output from L-star profile generated by ColorNavigator

data = load('L_CN_icm.txt'); g_eval_deriv_nolog.m



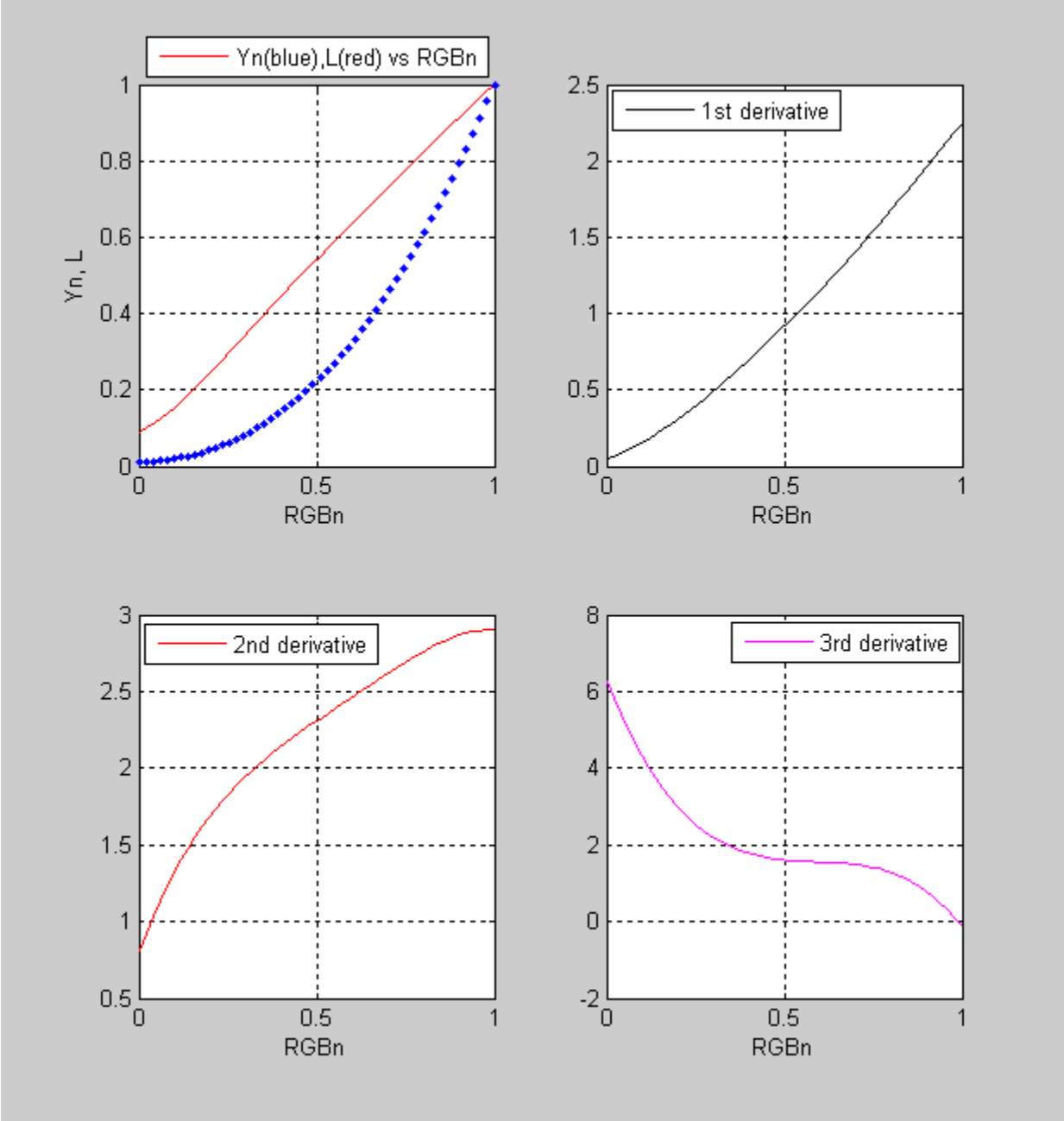
Type: lin; experimental data from L-star profile generated by ColorNavigator

data = load('lin_g_L.txt'); g_eval_deriv_nolog.m



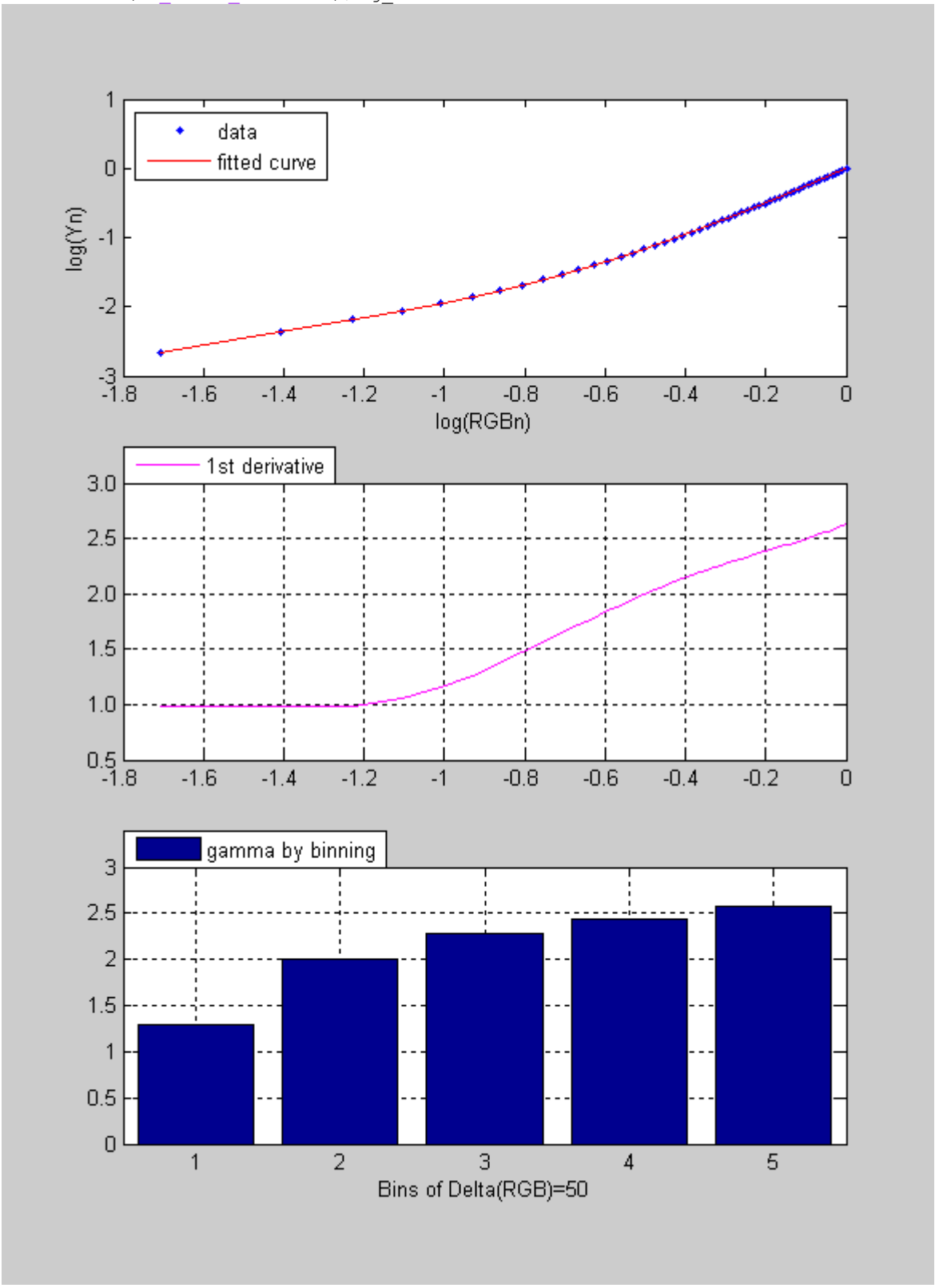
Type: gamma; experimental data from gamma profile generated by ColorNavigator

data = load('gray_g_22_nocm.txt'); g_eval_deriv_nolog.m

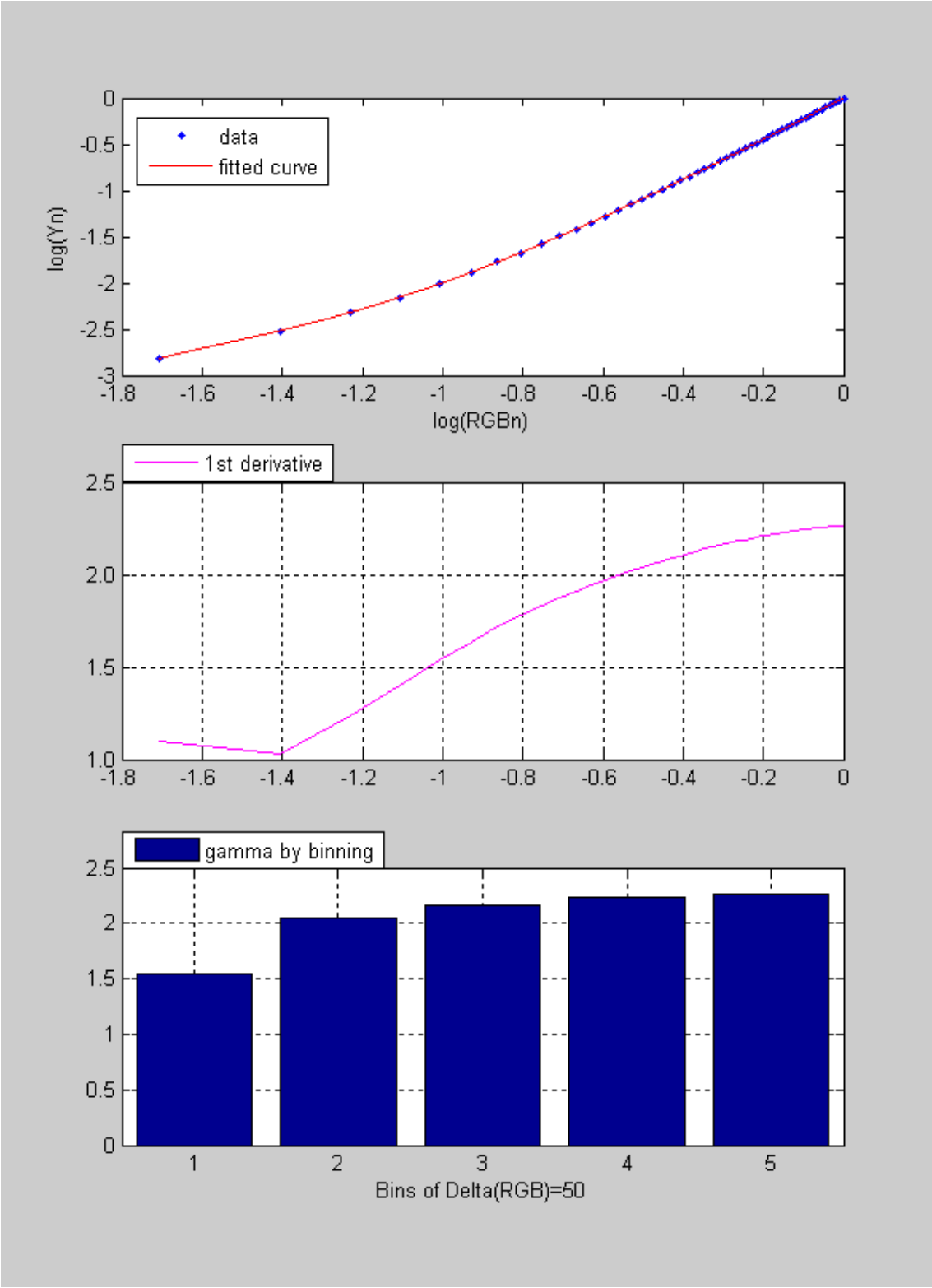


Type: lin; output from the L-star.icc profile

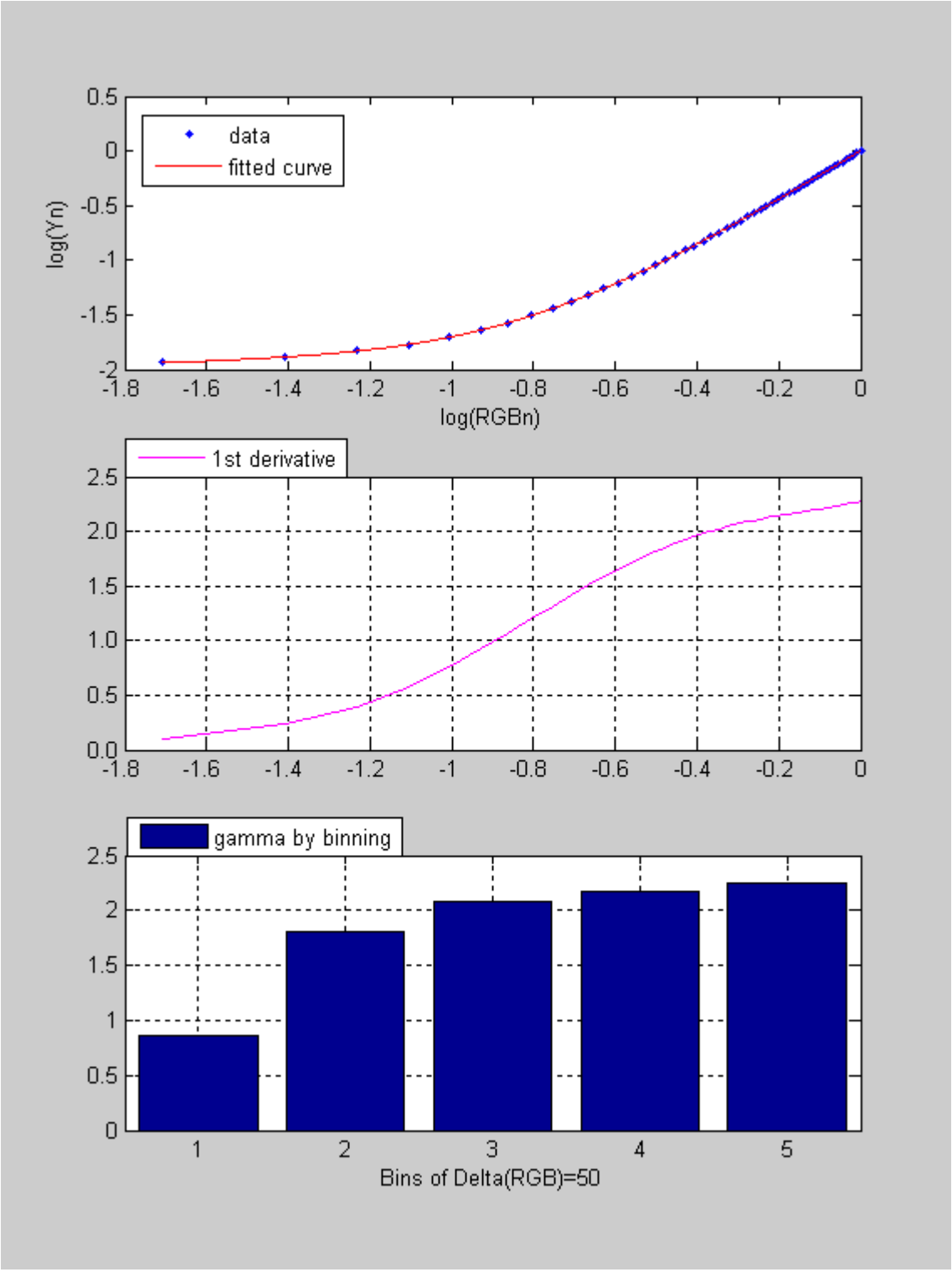
data = load('L_Lstar_icm.txt'); g_eval.m



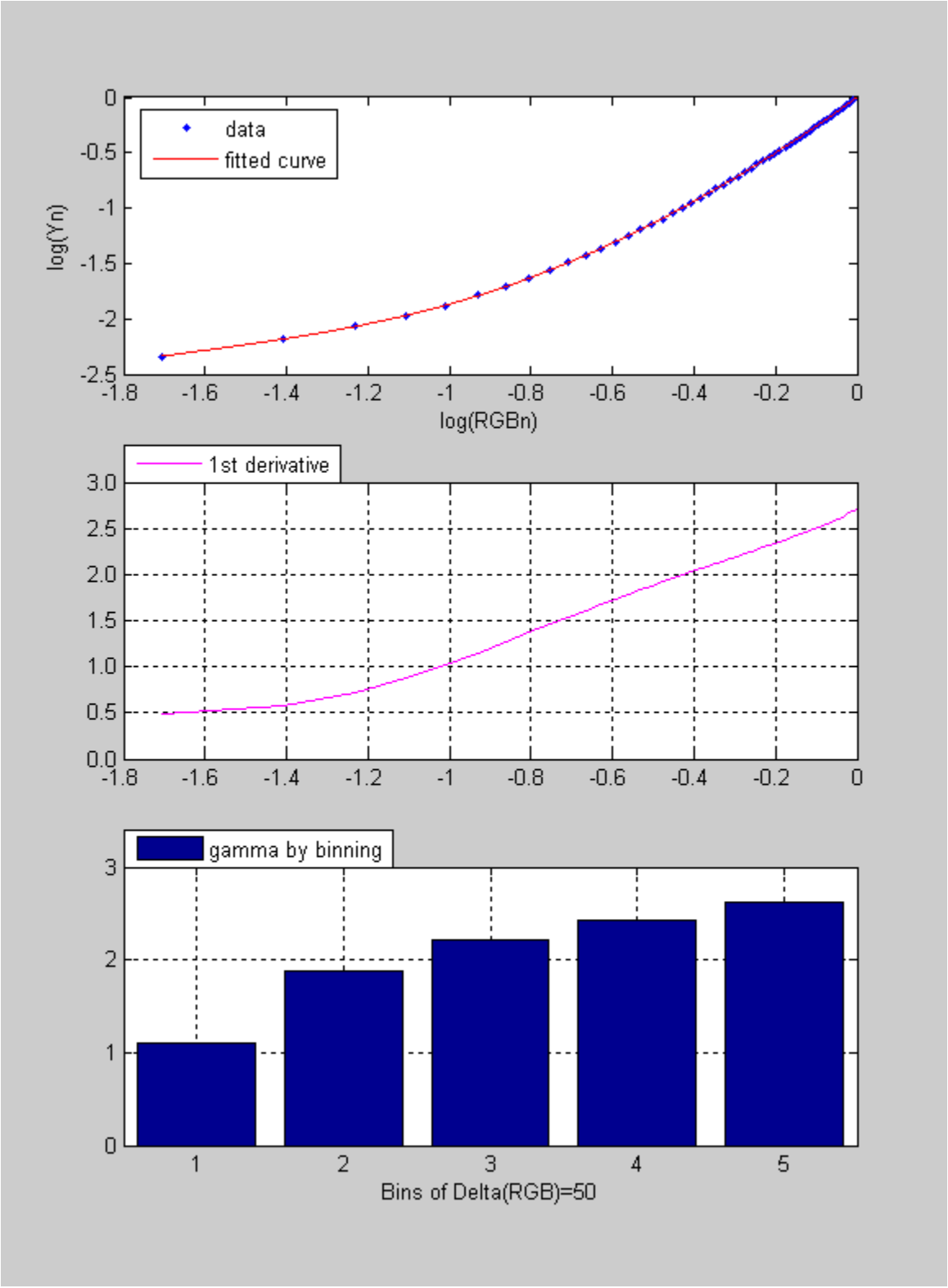
```
Type: gamma; output from the sRGB.icc profile
data = load('srgbY.txt');  g_eval.m
```



```
Type: gamma; experimental data from gamma profile generated by ColorNavigator
data = load('gray_g_22_nocm.txt');  g_eval.m
```

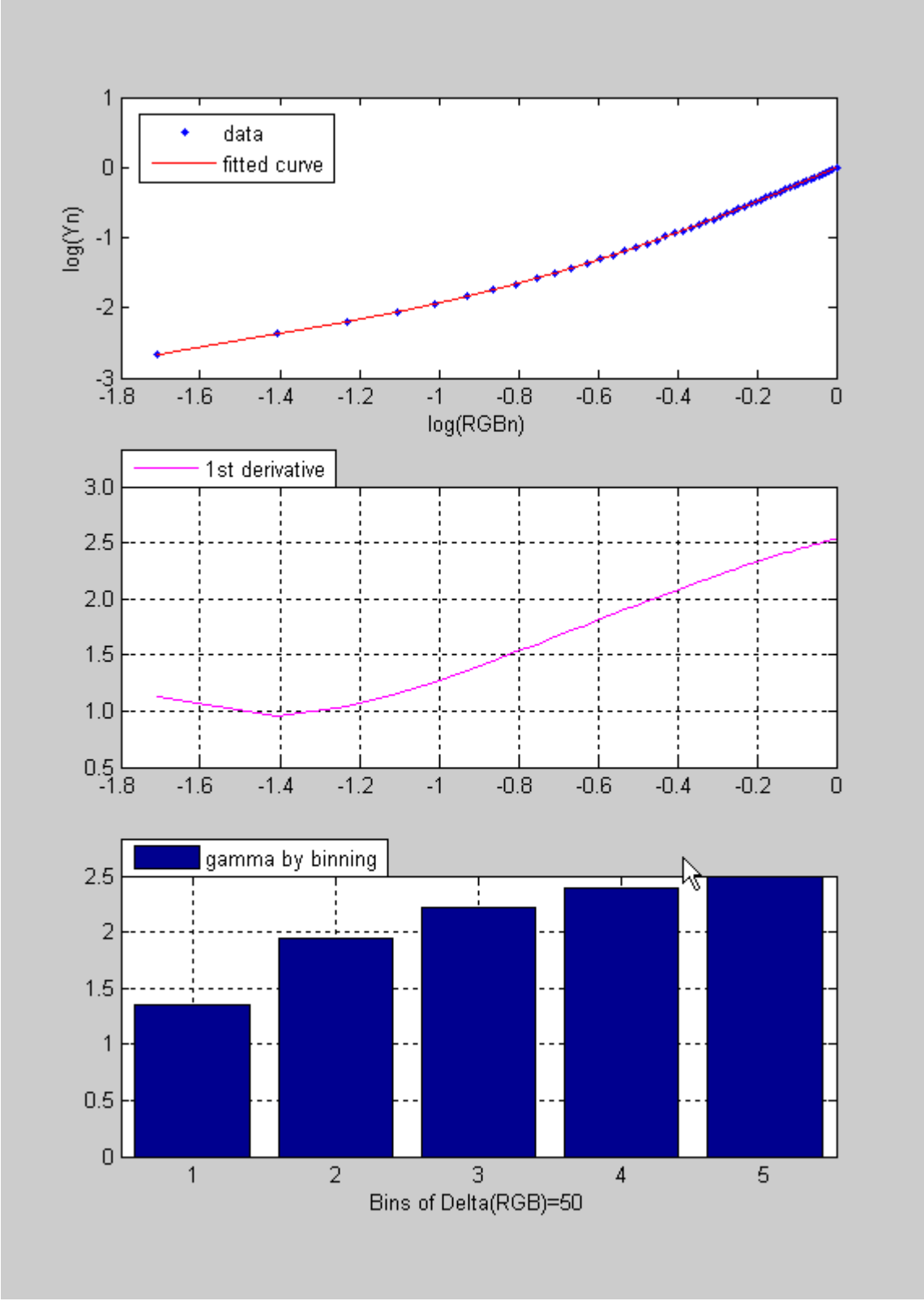


```
Type: lin; experimental data from L-star profile generated by ColorNavigator
data = load('lin_g_L.txt'); g_eval.m
```

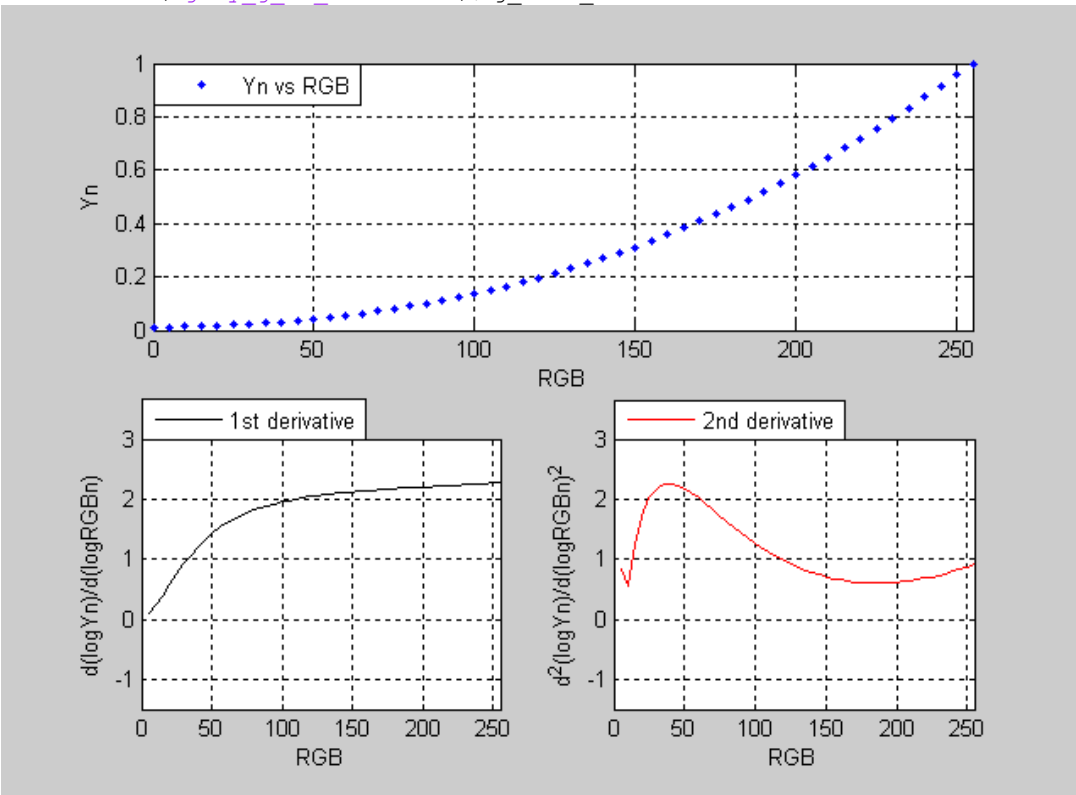


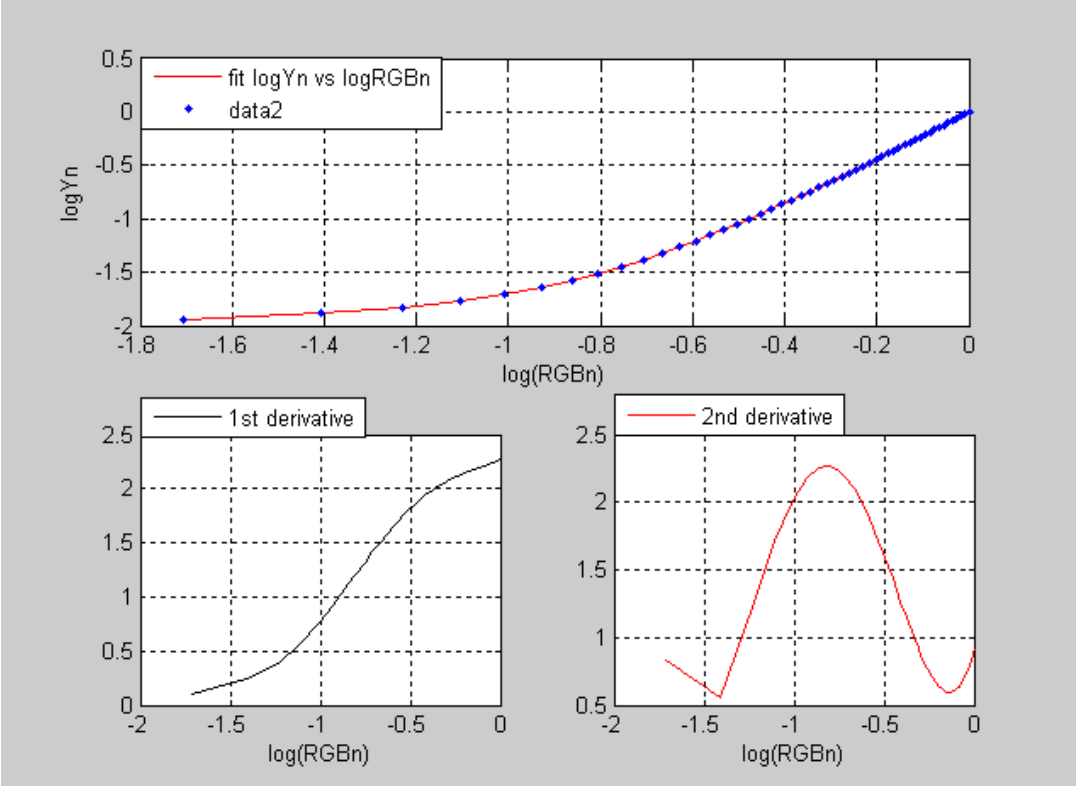
Type: lin; output from the L-star profile generated by ColorNavigator

data = load('L_CN_icm.txt'); g_eval.m

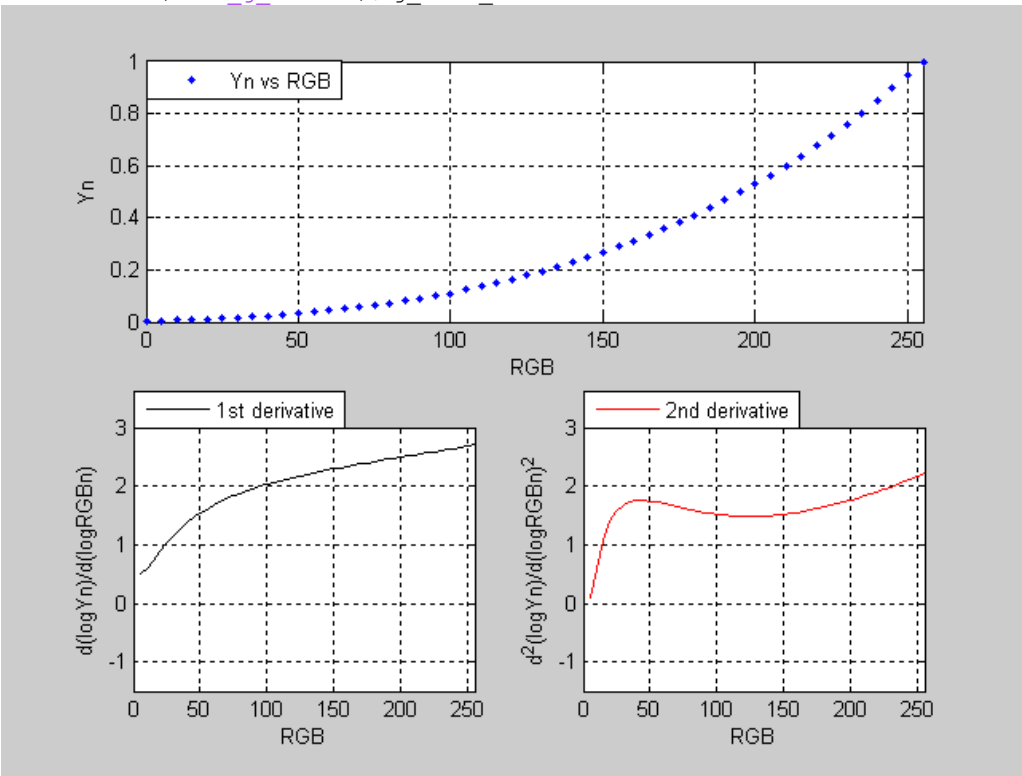


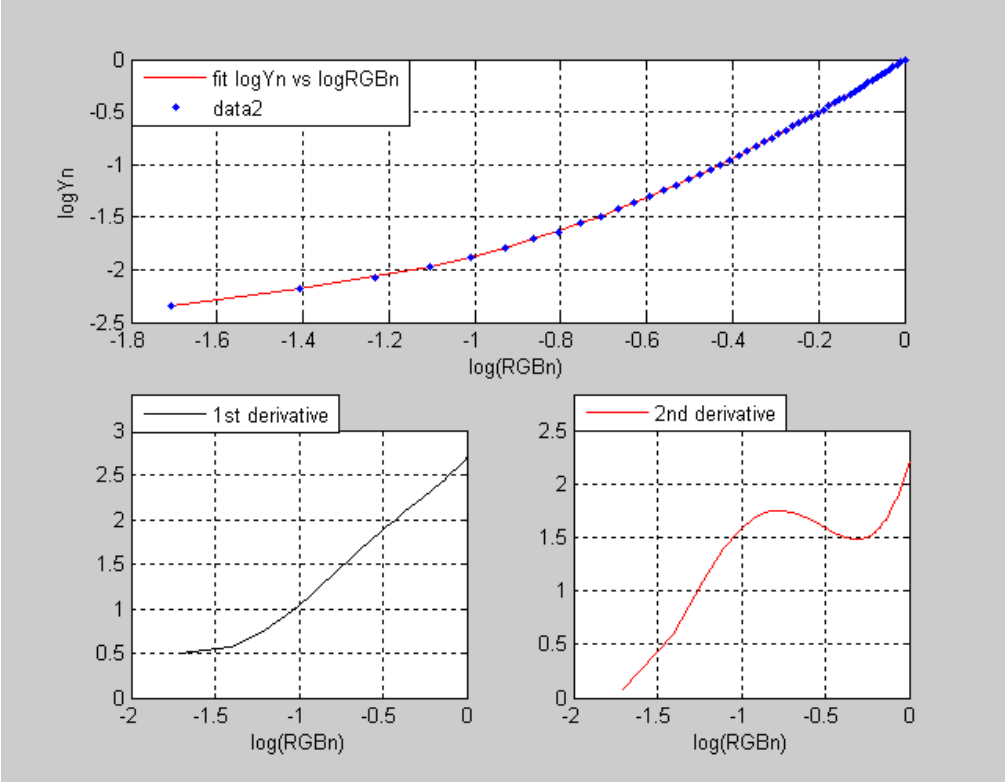
```
Type: gamma; experimental data from gamma profile generated by ColorNavigator
data = load('gray_g_22_nocm.txt'); g_eval_deriv.m
```



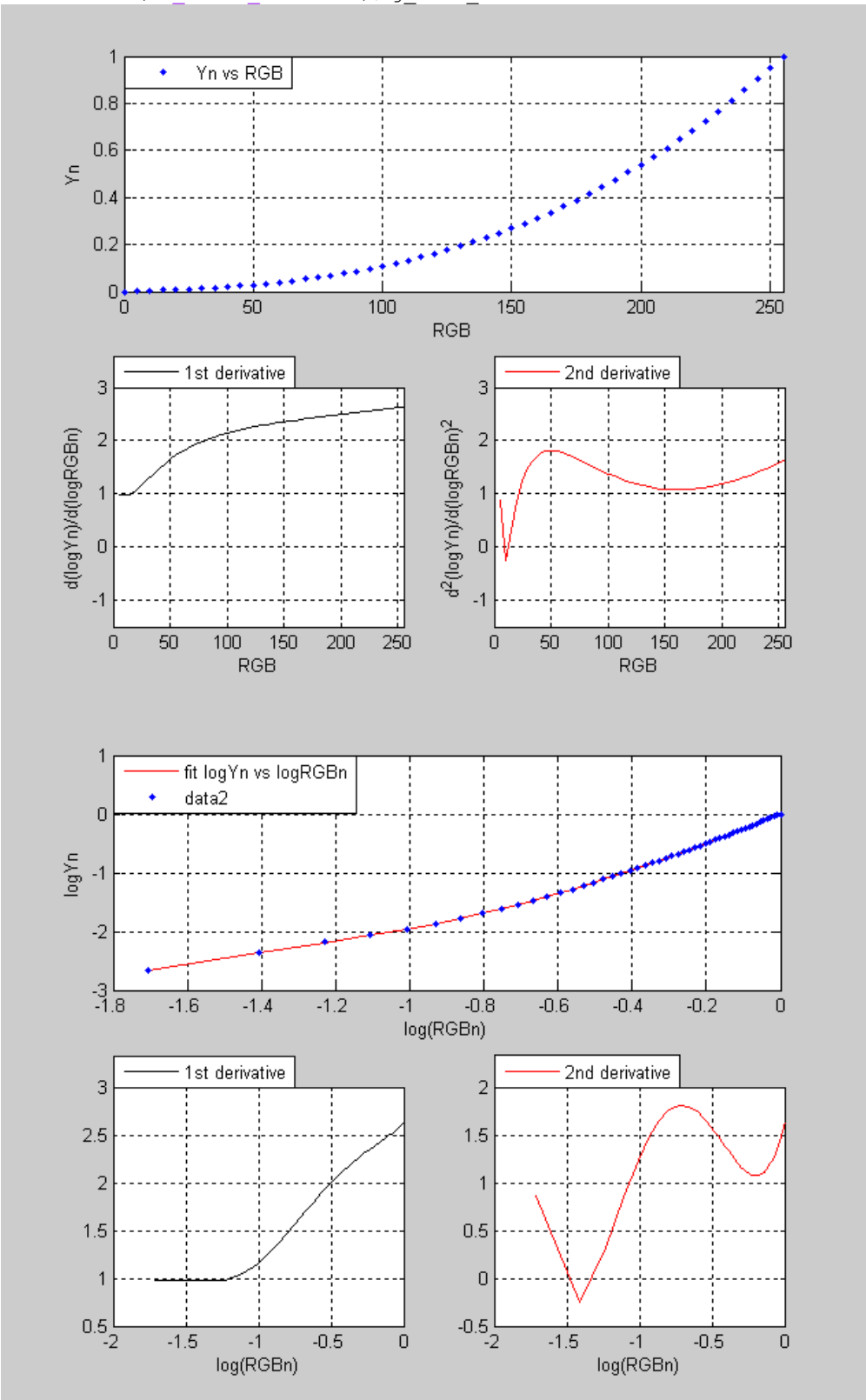


```
Type: lin; experimental data from L-star profile generated by ColorNavigator
data = load('lin_g_L.txt'); g_eval_deriv.m
```



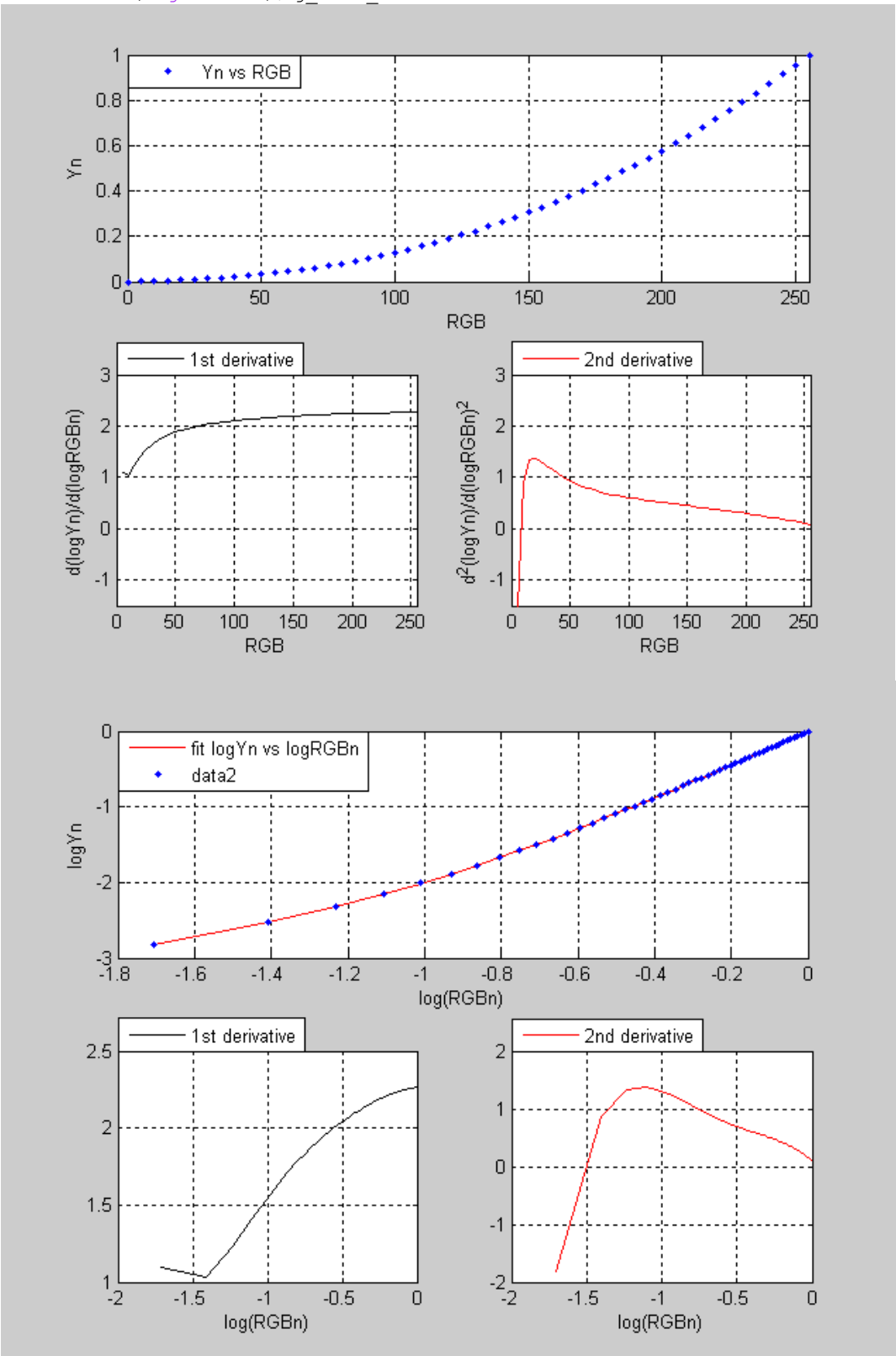


```
Type: lin; output from the L-star.icc profile
data = load('L_Lstar_icm.txt'); g_eval_deriv.m
```



Type: gamma; output from the sRGB.icc profile

data = load(srgbY.txt'); g_eval_deriv.m



Type: lin; output from the L-star profile generated by ColorNavigator

data = load(L_CN_icm.txt'); g_eval_deriv.m