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EEE 304 Lab: Control (Extra Credit)

Lab Description:

I have a 64 bit processor

This lab was about creating a feedback system with an LED light and a photoresistor. The feedback system maintain a designated brightness value by sensing how bright the LED is and increasing or decreasing voltage depending on the environment. The first step was to calibrate the sensor by stepping up the input gradually and recording the output. This gave us a gain value to use for the linear model. An exponential model wouldn't work here so that is why we needed to get the linear model. The feedback system was built and would stabilize at a value that was set. At a gain of 1 the system would stabilize quickly while a value less than that it would increase slower. At a gain value of 4 the system would become unstable.

Task 1

Input(constant block)	Output (Light Intensity)
10	35
30	50.25
50	72.25
70	107.5
90	164
110	260.5
130	429.8
150	724.8
170	1225
190	2035
210	3227
220	3947
224	4095
226	4095
228	4095
230	4095

Figure 1. Exponential Data

Task 2

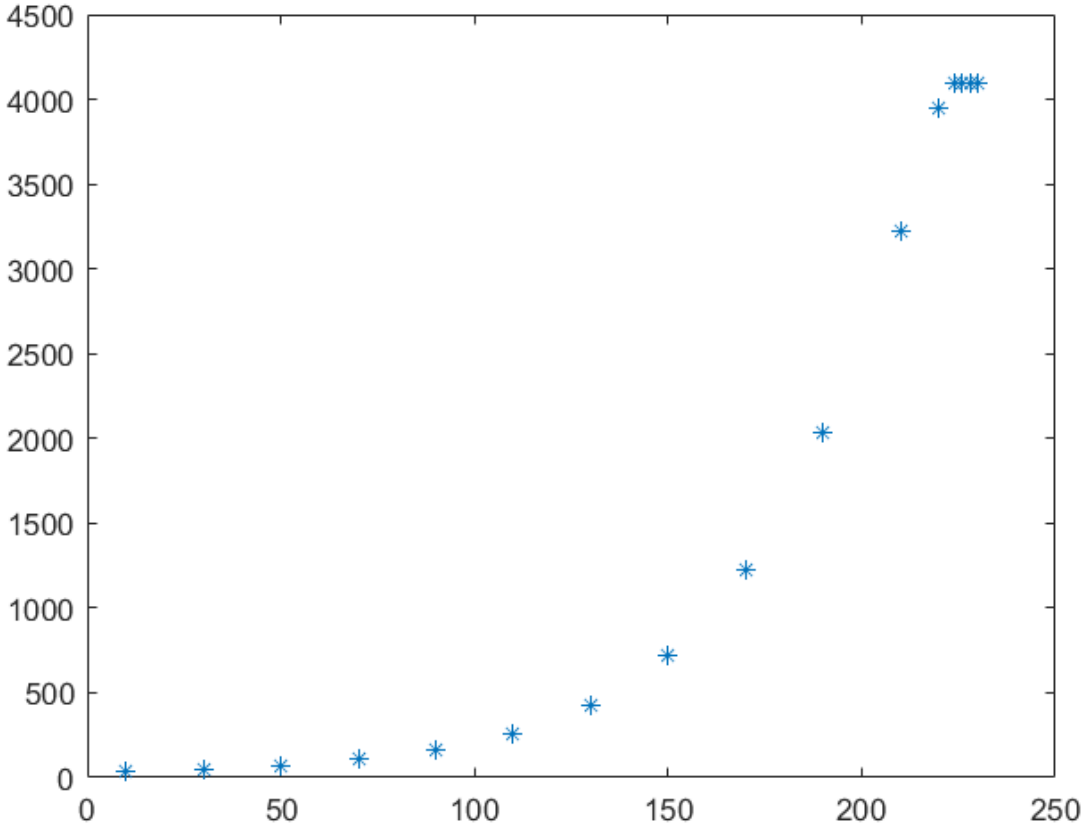


Figure 2. This is a plot of the Exponential Data collected

Task 3

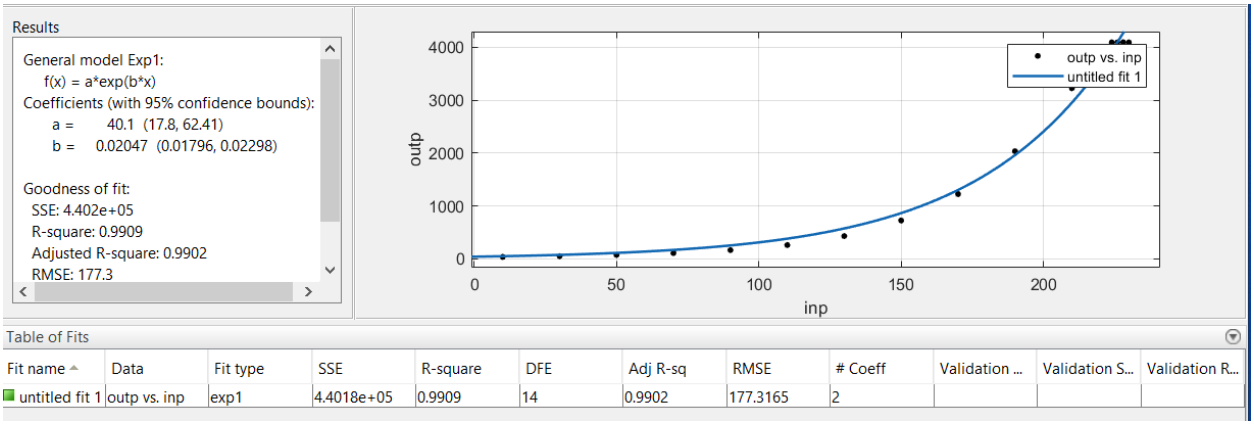


Figure 3. Regression of Exponential Data

Task 4

Input(constant block)	Output (Light Intensity)
10	188.8
30	557.8
50	945.8
70	1355
90	1752
110	2125
130	2509
150	2810
170	3137
190	3482
210	3771
220	3918
224	3993
226	3993
228	3993
230	4069

Figure 4. Linear Data

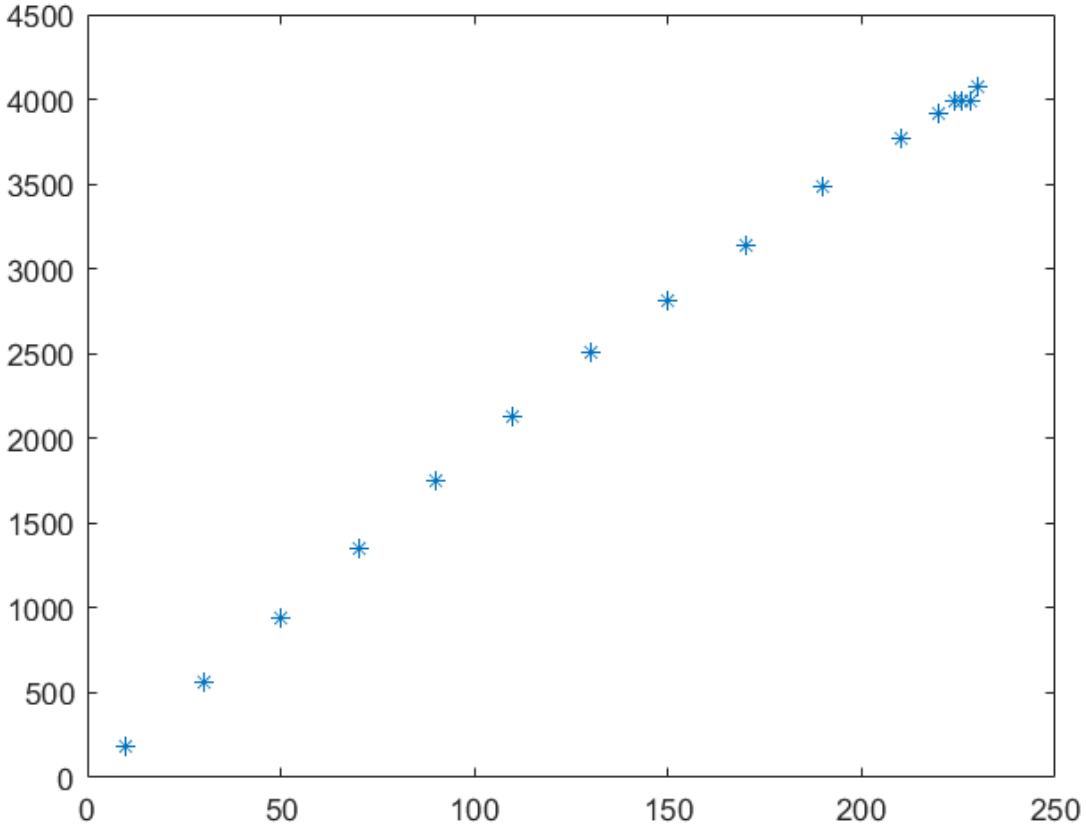


Figure 5. Linear Data plot

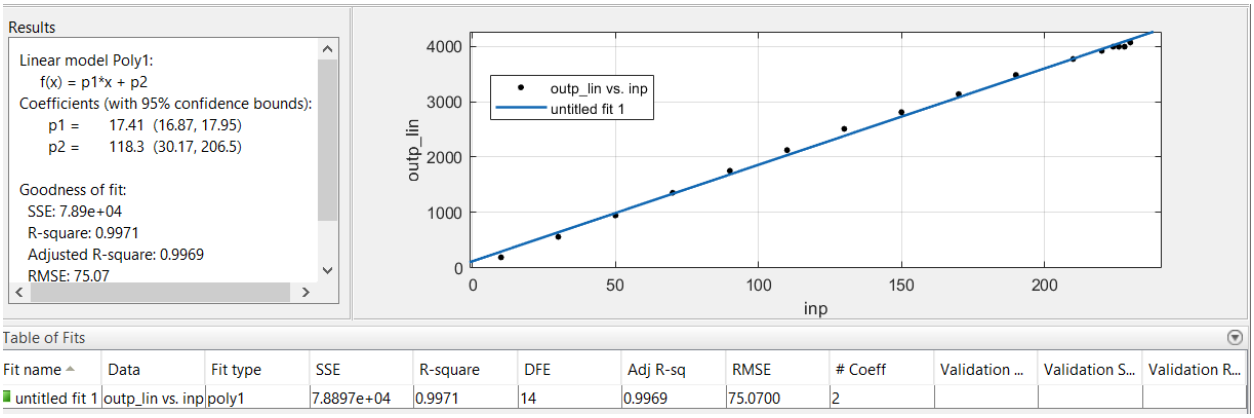
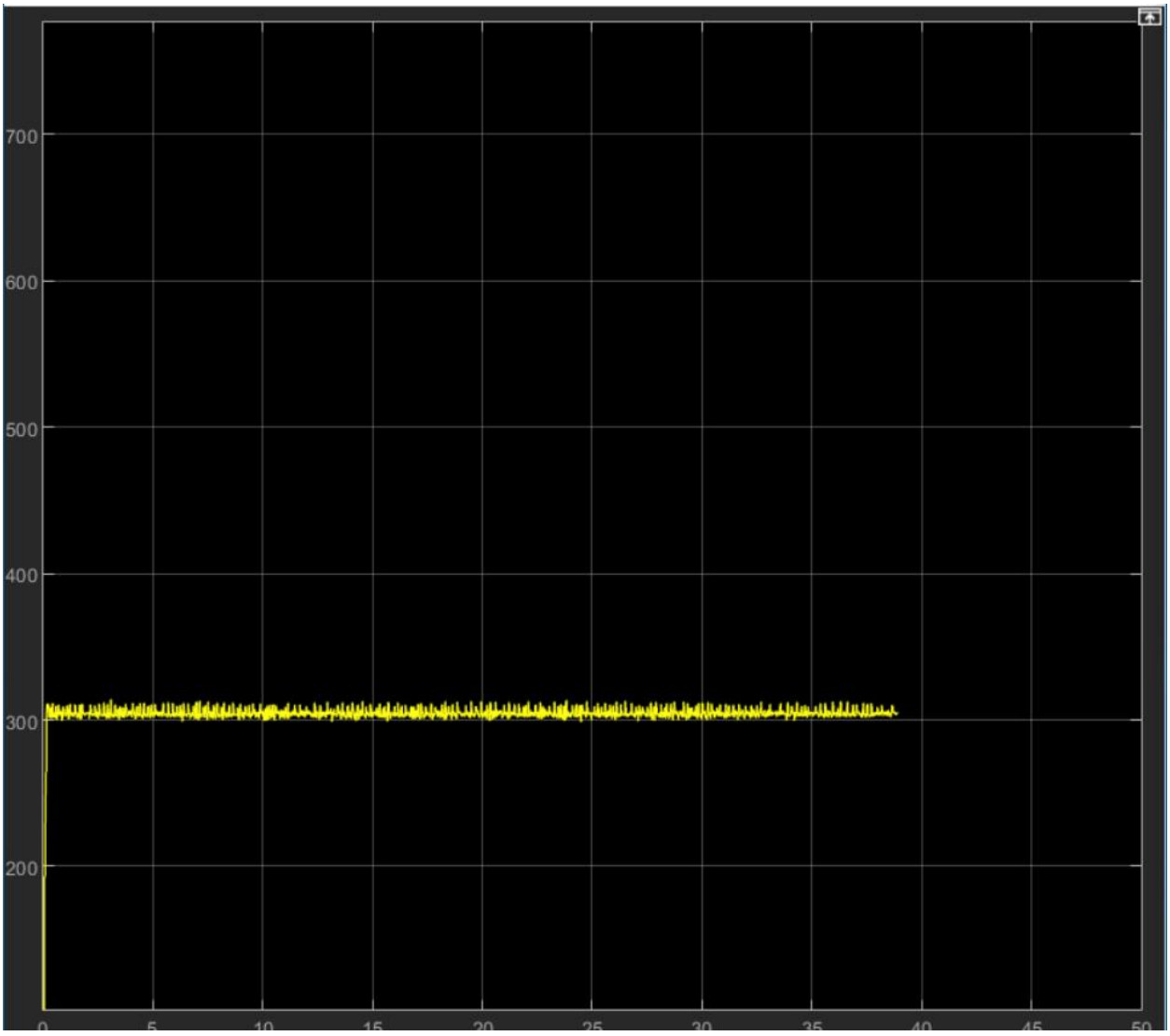


Figure 6. Linear Data Regression

How does it compare to the value of "a" computed in Task 3?

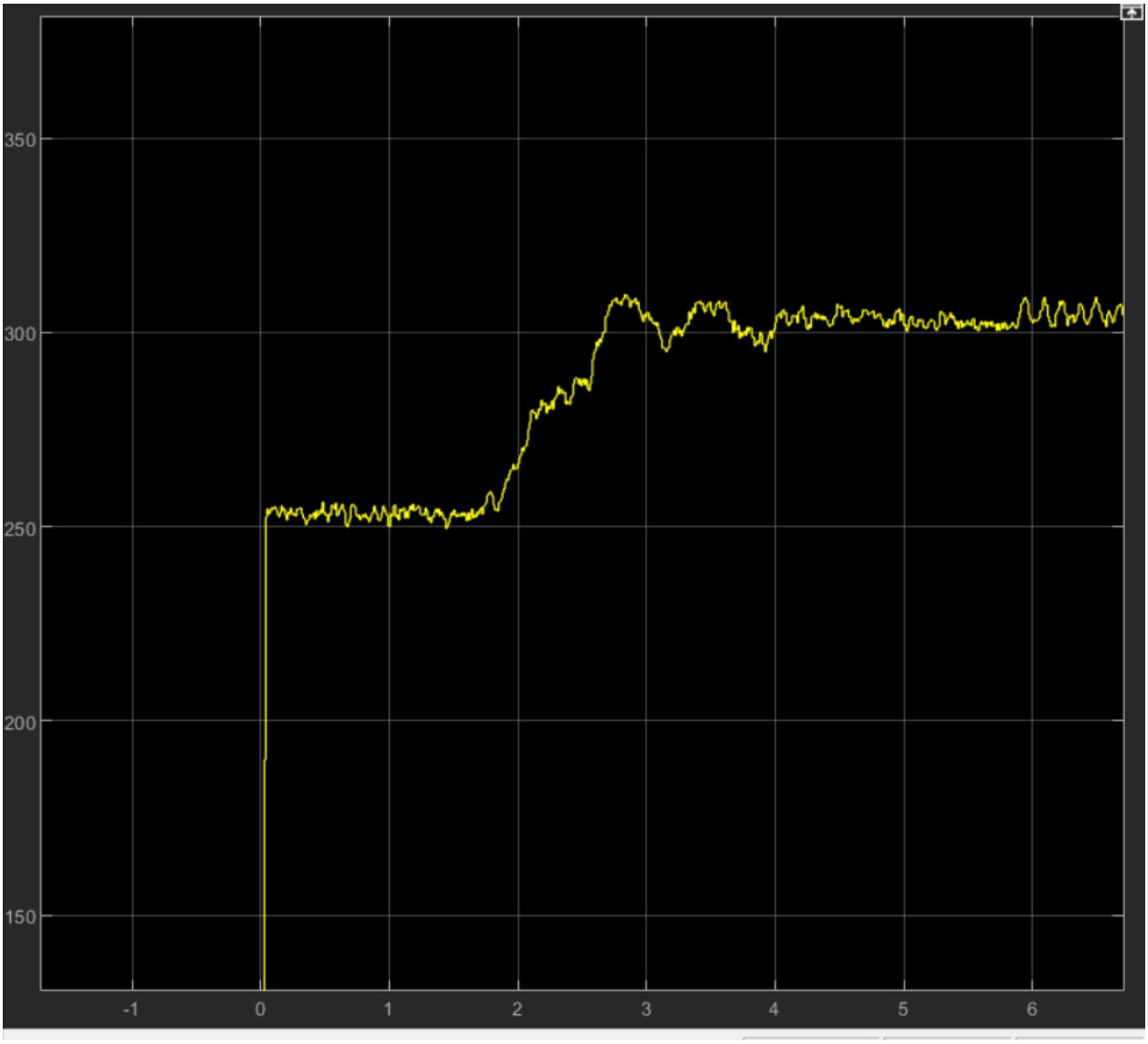
The a value for the exponential was 40.1 where the linear was 17.41

Task 5



Does the output stabilize at the same value of the reference? Is it a smooth curve? If not, explain why and how it could be smoothed.
Yes, you can see that it stabilizes at 300 where the reference is at 304.7. it is not smooth. It is sharp. Increasing the gain would provide a smooth curve to stabilization.

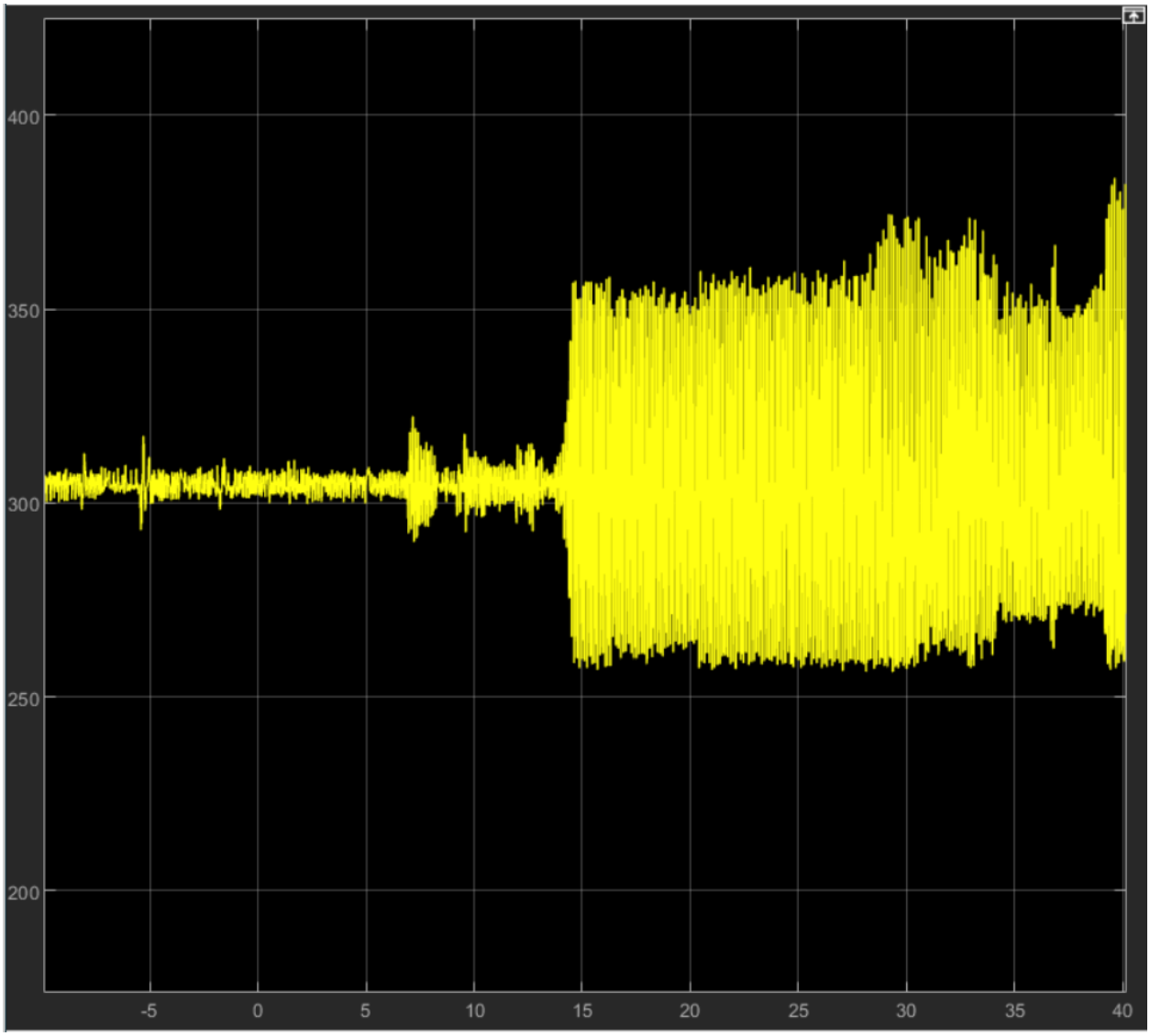
Task 6



Compare and
comment on how the light reacts when the Integral gain is 1 vs 0.1.

For a gain of 0.1 there is a curve up to 300 where when the gain was 1 it was sharper.

Task 7



As you can see, the output signal oscillates wildly and becomes unstable at 15 when I set the gain to 4.

Task 8