Course	ENGR 13300	Semester	*Fall 24*
Assignment Name	*EX3 Ind 3*	**Section**	*022*
Student 1 Name	Shivum Thatte	**Student 3 Name**	Ankur Raghavan
Student 1 Purdue login	sthatte	**Student 3 Purdue login**	raghav21
Student 2 Name	Andrew Gafford	**Student 4 Name**	Aristuto Paul
Student 2 Purdue login	agafford	**Student 4 Purdue login**	paul175
List collaborators if any (Name, Purdue login)			

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Problem Description our team has a sample of an unidentified bacterial specimen, and you would like to model its growth.

Input Section:

Table 1: <-- fill this

Time (hours)	Bacterial Count
0	10
2	15
4	25
6	40
8	60
10	80
12	100
14	120
16	150
18	180
20	200
22	220
24	230
26	240
28	250
30	255
32	258
34	259
36	260
38	260
40	260

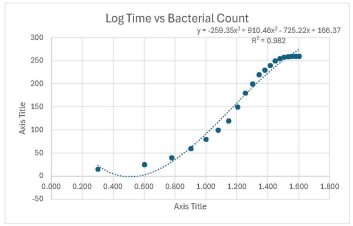
Calculation Section:

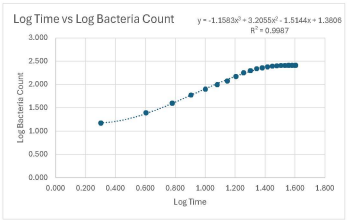
Table 2: <-- fill this

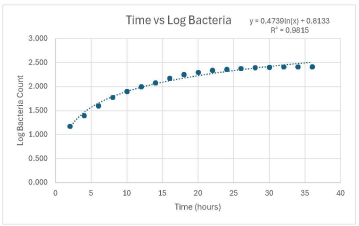
Log10 Time	Log10 Bacterial Count
UNDEFINED	1
0.301	1.176
0.602	1.398
0.778	1.602
0.903	1.778
1.000	1.903
1.079	2.000
1.146	2.079
1.204	2.176
1.255	2.255
1.301	2.301
1.342	2.342
1.380	2.362
1.415	2.380
1.447	2.398
1.477	2.407
1.505	2.412
1.531	2.413
1.556	2.415
1.580	2.415
1.602	2.415

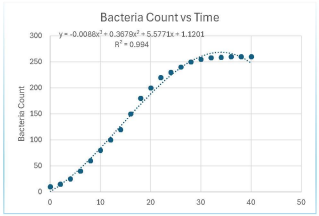
Output Section:

Figures 1-4. Generate all plots here in this box. Expand the box as needed.









Question a)

.What type of trendline did you use to best fit the data in that plot? Justify your answers. **We used third-order polynomial rgression models for the top left, top right, and bottom right graphs because these are the closest to the actual trend of the data. For the bottom left graph (time vs log bacteria count), the data follows a logarithmic shape, so we used a logarithmic regression line.**

Question b)

Use the model you chose in the previous question to predict the number of bacteria present after 19.5 hours. Is this number consistent with the given dataset? Why or why not?

We plugged in the value 19.5 into the equation for the trendline and received a value of 2.22 which gave us a value of 166 bacteria. This is not consistent with our data set as the bacteria was at 180 at 18 seconds and 200 at 20 seconds, indicating that the bacteria count at 19.5 seconds should be somewhere between these values.

Question c)

Use the model you chose in the first question to predict the time when there were 20 bacteria present. Is this number consistent with the given dataset? Why or why not?

$\log(20) = .4739\ln(x) + .8133$

$x = 2.7988$ hrs

This is consistent because in the data, between 2 and 4 hrs there was 15 and 25 bacteria count respectively. Since 20 is between these and 2.7988 hrs is also between the data is consistent with the calculation