Recommendations:

<u>Overall</u>

We cannot tell you the answers or whether you are right or wrong. You should be working on this alone. You may help others or seek help if you need assistance with Math Type/Graph 4.3/ MS Excel but not with anything related to the body of the work. (You <u>can</u> seek help on transformations but not in relation to this assignment)

Please number your pages! It would be best if your footer said 'page ___ of ___' so that we can easily tell if all pages are there and so that we can refer to your paper as we comment on the rubric.

A. Notation and Terminology

- Be sure to use proper notation, and don't use calculator notation, i.e. use x^2 and not x^2. Use the $\approx$ if you are rounding. Use the • if you're multiplying (not x or *). Use $\dfrac{2}{3}$ not 2/3.
- Use proper transformation terminology. (The word move should not be seen in this assignment)
- Equations and mathematical expressions should not break across lines.
- If your model includes rounded values, you need to use 'y $\approx$' and not 'y='

B. Communication

- This is a mathematics essay. It should include an introduction and conclusion.
- Question and answer format is not acceptable.
- The original task should not be necessary to understand your work. In other words, your paper must be complete and be able to stand alone.
- You should include the data that you are using. In the first part of the assignment, include the first data set. In the later part of the assignment, include the second data set.
- You should explain how you chose your parent function. You should <u>not</u> explain why you did not choose other parent functions. The only exception to this would be if you were strongly considering two different models and wanted to explain why one is better than the other. In this case, you need to explain why each would be potentially reasonable.
- You must fully explain how you analytically found your model equation. This can be done algebraically (with explanations in words) or through transformations (with explanations in words).
- You do <u>not</u> need to fully explain how you found your regression equation. (Don't tell me which buttons you pushed on your calculator or in graph 4.3)
- We are looking for clear, concise, non-repetitive communication (If your essay is too long it will be considered ineffective communication).
- All data tables and graphs should have titles and be within the body of essay (not attached at the end).
- All graphs should be fully labeled and labels should be <u>consistent</u> throughout the essay.
- All graphs should be of a reasonable size. Do not shrink your graphs down so that your paper is fewer pages. Make sure that the graphs are readable! Tables and algebraic working should not break across pages.
- Your axes should be labeled. It is better to write a label on one of these graphs by hand, than not write one at all.
- Your graphs should appear within the body of work to which they are relevant, not as a random appendix at the end.

C. Mathematical Process

- Criterion C is concerned with developing mathematical models (functions and equations) to <u>best fit</u> the given data both analytically and using regression. It is not concerned with whether the models (equations) make contextual sense. If you only come up with one model that fits the data well, then the most you can earn in this category is a 2.
- You must explicitly define your variables and constraints for this set of data. You should explicitly state the parent function for which you are trying to come up with an equation, for both the analytical model and the logistic regression model. You must explicitly state all parameters, for both your analytical model and logistic regression model. If possible you must define certain parameters as well. Before coming up with a function, you need to state the equation of the parent function, e.g..

1. $y = |x|$ is the parent absolute value function.

2. x and y are the variables, they represent _____ and the constraints on them are _____.

3. If $y = a[b|x-c|]+d$ where a, b, and c are the parameters of this function where a gives the...

- Be very careful that you consistently define your variables the same way. We suggest that you don't use the year as the independent x-variable, i.e. x should not represent the year
- When defining the constraints on the variables, do not restrict your attention to the data. You should consider the WHOLE context of the task.
- Be sure to communicate why you chose specific values for your parameters. Guess and test is not appropriate.
- Don't state your model before developing it analytically.
- FYI, the logistic regression can be found on your TI-calculators, but not on Graph 4.3, Autograph or Excel. You will need to input the data points into your TI-Calculators and run the logistic regression.
- Make sure you explicitly state the equations of your functions. Some people find the parameters and/or sketch the given functions but forget to state the equation of their function in appropriate math terminology. The equation as it appears by default in the legend in Graph 4.3 is not good enough. You must state the equation clearly and separately for both of your model functions.
- Consideration of the model's fit can be done qualitatively but must be more specific than, "it looks like it fits well." It would be better to say that, "The model fits well in terms of modeling the trends in the data, but we can see that it doesn't pass through may points on (state a specific interval or intervals)." This would best be supported with a graph or table.
- Make sure that you graph your model functions for the given constraints that you specified earlier in your work. In Graph 4.3, this can be done in the "argument range" for your given functions. See us for help.
- In this portfolio assignment, "applying the model to other situations" involves seeing how well both of your models fit the second data set at the bottom of the page. You should adjust your model as necessary. Simply coming up with a new model to fit all the data is not good enough!
- In order to best compare the models, it is a good idea to graph both models on the same set of axes with the data set(s), clearly identifying each one.

D. Results

- Criterion D is concerned with how reasonable the results are in the context of the task, NOT how well the model functions fit the data.
- You will then need to decide how reasonable each of these model functions as time progresses beyond the given data set.
- In order to achieve a 5 in this category, you need to "correctly and critically interpret the results of the reasonableness of the model in the context of the task, to include possible limitations and modifications of these results".
- To the appropriate degree of accuracy is to three or four significant figures, NOT to a number of decimal places.

$y = 0.000506x^2 - 0.752x + 1.38$ is to three significant figures

$y = 0.0005x^2 - 0.752x + 1.38$ is NOT!

Not too many people get a 5 in this category. A 4 is a pretty good score to receive.

E. Technology

- It does not mean word processing, although word processing is expected. It means using Graph 4.3 or equivalents to plot the data points and model functions, but still clearly writing/expressing the equations of your model functions elsewhere.
- Technology is also about using regression and graphs well. Don't just include graphs because the questions prompt you to do so. Use them to help you develop your model and to illustrate whatever points you are making. If you want to discuss what will happen in the future, adjust your window so that the reader can see what the model illustrates in that time frame.
- We can help you if you are unfamiliar with Graph 4.3 or Excel.
- Never stating the equation of your logistic regression function in proper notation, would also hinder your technology grade.

If you work in color, but print in black and white, make sure that the reader can tell the difference between your functions, once printed. If not, this will hurt both your technology grade and your communication grade. Do not refer to red graph in a paper that is in black and white!

F. Quality of Work

- Expect to get a 1 in this criterion. You will only get a zero if your work is truly lacking/appalling in some way. You will only get a 2 if your work makes your teacher pause in awe of what you've done. A score of a 2 here is reserved only for truly exceptional work.