<u>**Recommendations**</u>:

<u>**Overall.**</u> First do all of the working, and answers to the questions. The next step is to begin typing up this paper. Write the meat of the work first, i.e. leave the introduction and conclusion (the bun) until the end. Then, write your introduction and conclusion. Your introduction should still go at the beginning of your document and your conclusion should go at the end. Lastly, proofread your document for typos and to see how well this "essay" flows, and check to see whether you have followed all of our recommendations and items contained within the rubric. If you have general questions, please ask us. 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.

<u>**A. Notation and Terminology**</u>. 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. If you're using the Graph 4.3 program (www.padowan.dk), you can insert text boxes, which have Math Type embedded in them. Use terms like constraints, parameters and variables correctly. Be sure to explicitly write the equations of your model functions in appropriate math terminology, i.e. not just in the legend of Graph 4.3.

<u>**B. Communication**</u>. This should be viewed as a math essay, with an introduction which introduces everything you're going to do in the paper and a conclusion which summarizes what you did in the paper as well as all your findings, in this case your model equations, how well they fit the data, and what they meant in context. Question and answer is not acceptable. Do not restate the questions. What you are finding should be clear without restating the questions. A paper without an introduction and a conclusion will not receive a 3 in this category. You must fully explain how you analytically found your model equation, but you do not need to fully explain how you found your regression equation. You do not need to do screen dumps from your TI-Calculator, although you should state where your logistic model equation came from. We are looking for clear, succinct, non-repetitive communication.

The **suggested maximum length for this paper is** <u>**1800 words**</u>. Anything longer than that would be considered to be ineffective communication, and will be penalized. Graphs do not count towards the word count. When you submit it to turnitin.com, the number of words showing up will increase. This is okay. If it is a lot more than 1800 words, then you should be worried.

<u>**C. Mathematical Process**</u>. 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 two.

Firstly, 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 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, i.e.

1. $y = ax^2 + bx + c$ is the parent quadratic function.
2. x and y are the variables, they represent _____ and the constraints on them are _____.
3. a, b, and c are the parameters of this function, where a gives the vertical stretch from the parent function, c gives the y-intercept of the function, while b is a parameter of the equation.

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. X as the year won't work if you decide to use a matrix method.

FYI, the logistic regression can be found on your TI-calculators, but not on Graph 4.3 or Excel. You will need to input the data points into your TI-Calculators and run the logistic regression. First, you will need to input the x-values into List 1, and the y-values into List 2 (STAT→EDIT).   To run the logistic regression on your calculators, type STAT→CALC→(scroll down) B→ENTER, 2nd 1 comma (below sin), 2nd 2. ENTER. Make sure you state the equation of your logistic function in proper math terminology. You can then use Graph 4.3 or an equivalent to graph your function. If the graph of your logistic function doesn't match the data points reasonably well, then you probably haven't entered it correctly, i.e. with the parentheses in the right places. You do not need to explain the above steps in depth to the reader, although you should give a brief idea of how you came up with your logistic function.

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.

The nice thing about the modeling portfolio is that by visual inspection you know whether or not your model equations fit the data, so make sure that both models fit the initial data set pretty well. If they don't, you did something wrong and need to find your mistake. It is very important that both of your models should fit the initial data set reasonably well.

To "consider how well the model fits the data", you need MORE THAN a simple visual inspection, i.e. sketching the model functions versus the data points and then commenting on how well they fit the data points. So is there some algebraic or technological way that you can accomplish this??? You must do this for both of your models.

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. Again, you need MORE THAN a simple visual inspection when commenting on how well they fit the data points. So is there some algebraic or technological way that you can accomplish this???

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.

At the end of the portfolio, it asks you to "modify the model that best fits the IMF…."
At this point, you can use regression to give you your modified model, even if your better fit model was initially the analytical 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.

In this portfolio, you will need to extend your "window" to see what happens to your model functions beyond the given data range. 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!

Sig figs is not the number of decimal places!

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

E. Technology. Using technology is a lot easier this time. 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 well. Additionally, are there other technologies that you can use to help with determining goodness of fit???

We can help you if you are unfamiliar with Graph 4.3 or Excel. Your graphs should have gridlines. Your graphs should have titles. 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. Not putting your graph in the right place in your paper would count both as ineffective communication and ineffective use of technology. 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.

Submission - Final

The final version of this paper must be submitted to turnitin.com. The class ID will be given to you shortly as will the password. The deadline for turnitin.com is the same as for the paper copy.

Your title page should be the rubric with your name printed on it. Failure to do this will result in a 2% deduction to your ISM grade. Your portfolio should be handed in as stapled, paper document. No duotangs, plastic pockets, etc. Failure to do this will result in a 2% deduction to your ISM grade.

A physical copy of the paper must be turned in by 8:30am on Wed Oct 20th 2010 to the HS Office, even if you're not in school. A late penalty of 1% per minute late will apply to your ISM grade for the first 100 minutes, i.e. until 9:10am. Copies received after that will receive a grade of 0%. The same late penalty will apply to turnitin.com