

Independent Mathematics Contractors
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Dear IMC:

My organization is interested in predicting college costs in the future. We supply projections to government agencies as well as colleges to help them make better decisions. We have modeled college costs using linear functions with limited success. These models assume that costs are increasing over time at a constant rate. However, we believe that a quadratic model would be more appropriate.

Accompanying this letter, you will find a list of states, types of colleges, and tuition costs for the school years 2007-2008 through 2009-2010.

In your analysis, we would like you to find quadratic models for the cost of attending a four-year college and the cost of attending a two-year college in the state you were assigned. Use these models to compare the cost of attending a four-year college for four years to the cost of attending a two-year college for two years and a four-year college for two years. Specifically, determine how much is saved by attending two-year college to attain a four-year degree versus attending a four-year college to get the degree. To make this comparison, you will need several assumptions.

- Assume that students spend four years in college. By this, we mean that a student will spend all four years at the four-year college or the first two years at the two-year college and last two years at the four-year college.
- Assume that you will be attending college over the school years 2013-2014 through 2016-2017.
- Ignore any costs associated with room and board. Also, ignore any financial aid students might receive.
- Each quadratic model must pass through three of the data points you were given for each type of institution.

To make the comparison, we anticipate that you will need to complete a number of tasks:

- **Technology Assignment – Use Matrices to Find a Model:** In this technology assignment, you will learn how to use matrices to find the constants in a linear model. This is the same technique that you can use to find the constants in the quadratic model.
- **Technology Assignment – Find a Quadratic Model for College Costs:** In this technology assignment, you will find the parabola that passes through three of your data points. Once you have the model, you will graph your functions to ensure they pass through three of your data points.
- Use your functions to find the total tuition and fees to attend a two-year college in the state you were assigned from 2013-2014 through 2014-2015 and a four-year college (either public or private) in the state you are assigned from 2015-2016 through 2016-2017.
- Calculate the savings.

The technology assignments were designed to help guide you through the solution process. Once you have completed these tasks, you will need to document the process you used to reach your answer. Feel free to discuss the *process* amongst yourselves, but make sure that the documentation you turn in is your own work and you complete the solution for the state with two-year and type of four-year college you were assigned. If you are unclear on what is expected in your documentation, contact your instructor via email or by phone.

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