**Task 2: Polynomial Functions**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | R | 1 | 2 | 3 | 4 |
| Identify and describe some key features of polynomial functions, and make connections between the numeric, graphical, and algebraic representations of polynomial functions;  |  |  |  |  |  |
| Solve problems involving polynomial and simple rational equations graphically and algebraically;  |  |  |  |  |  |
| Demonstrate an understanding of solving polynomial and simple rational inequalities. |  |  |  |  |  |

Thangaraj Shoe Company has recently entered the shoe market. It is tracking the relation between the total sales and the number of dollars spent on its most recent advertising campaign. Below is a table that compares their advertising budget and their sales.

|  |  |
| --- | --- |
| Advertising Budget, in **tens of thousands** of dollars$$x$$ | Sales in **hundreds of thousands** of dollars$$S$$ |
| 50 | 34 |
| 100 | 125 |
| 150 | 253 |
| 200 | 400 |
| 250 | 547 |
| 300 | 675 |
| 350 | 765.5 |

1. Plot the data by hand on a graph.
2. What is the degree of the function that can be used to model this data? Explain how you know.
3. Determine an equation that models this data.
4. Describe what is happening to sales in relation to the advertising budget.
5. Does it seem that the domain should be restricted? (i.e. the function doesn’t seem to make sense for some x-values). If so, how should it be restricted?
6. According to the model, when does the company reach $10 000 000?
7. According to the model, when are the sales less more than $50 000 000?
8. Create a sales (revenue) vs. advertising graph for Nike (see below). Compare the relationship between sales and advertising for Thangaraj Shoe Company vs. that of Nike.

<http://fortunedotcom.files.wordpress.com/2012/02/nike_advertising_revenue.jpg>

