Math 4 Honors Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lesson 2-4: *Constructing Polynomial Function Models* Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Learning Goal:

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| --- |
| * *I can fit polynomial function models to data and graph patterns using problem conditions, statistical regression, and the method of undetermined coefficients (which is an application of matrices).*
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*You will need to use at least 4 control points. Enter your points into a spreadsheet on your calculator. Run a regression . . .*

 The points $\left( \right), \left( \right), \left( \right) and \left( \right)$ give the equation

 $y=$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_





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 ***Solve the system using substitution.***

d. What would the matrix equation look like to solve the system in 3b? Solve the system using the

***inverse-matrix method*** to verify what you found in part c.

 e.



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$$256a-64b+16c-4d+e=0$$

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 b. Translate the system from part a into a matrix equation. Write the matrix equation below.

 c. Use the inverse-matrix method to solve the system. Write your solution matrix below.

 d. $j\left(x\right)=$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. If you had to use the method of undetermined coefficients to find the equation of a 5th degree polynomial, what would be the minimum number of control points you would need? \_\_\_\_\_\_\_\_\_

* How many equations would make up the system you would have to solve? \_\_\_\_\_\_\_\_\_
* What key points might you choose for your control points?

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**Lesson 2-4 Homework** Page 6

*Show all work on another sheet of paper.*

1. Use a system of equations to find the quadratic function that satisfies the quadratic function

 *f*(*x*) = *ax*2 + *bx* + *c* that satisfies the given equations. Use matrices to solve the system.



 *f*(*x*) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Use a system of equations to find the cubic function that satisfies the cubic function

 *f*(*x*) = *ax*3 + *bx*2 + *cx* + *d* that satisfies the given equations. Use matrices to solve the system.



 *f*(*x*) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Use a system of equations to find the equation of the parabola *y*  = *ax*2 + *bx* + *c* that passes through the points. Use matrices to solve the system. Graph the equation in your calculator to verify your results.



4. 5.