## Algebra 2

## 2-05 Write Quadratic and Polynomial Models (4.9)

## Find a Polynomial Model Given x-intercepts

1. Write a polynomial model in the form $y=a\left(x-k_{1}\right)\left(x-k_{2}\right)\left(x-k_{3}\right) \ldots$ where there is one factor per $\qquad$ .
2. Substitute the $x$-intercepts for the $\qquad$ .
3. Substitute the other point for $\qquad$ -.
4. Solve for $\qquad$ _.
5. Write the $\qquad$ function.

Write a polynomial model with $x$-intercepts are $-2,1,3$ and $(0,2)$

## Find the Degree of a Polynomial Using Finite Differences

1. Have a table of values with $\qquad$ spaces $\qquad$ .
2. Find the $\qquad$ of successive $\qquad$ .
3. Find the $\qquad$ of successive $\qquad$ from the previous step.
4. Repeat until all the differences in a step are the $\qquad$ number (not zero).
5. The number of $\qquad$ of differences is the $\qquad$ of the function.
Find the degree of the polynomial passing through $(0,1),(1,6),(2,25),(3,70),(4,153),(5,286)$

## Finding a model given several points

1. Use $\qquad$ difference to find the $\qquad$ .
2. Use either of the following methods.
a. Method 1: Solve a System of Equations by Hand (This lesson uses Method 2)
i. Write a general polynomial function of the given degree such as $y=a x^{3}+b x^{2}+c x+d$.
ii. Substitute a point for $x$ and $y$ to get an equation where the variables are the coefficients.
iii. Substitute another point in the general polynomial for $x$ and $y$ to get a second equation where the variables are the coefficients.
iv. Continue substituting points until there the same number of equations as coefficients.
V. Solve the system of equations using something like elimination to find the values of the coefficients.
vi. Write the equation by substituting the coefficients into the general polynomial.
b. Method 2: Use a $\qquad$ on a $\qquad$
3. Push STAT and select Edit....
4. Enter the $x$-values in List 1 (L1) and the $y$-values in List 2 (L2).
5. To see the graph of the points
a. Push $Y=$ and clear any equations.
b. While still in $Y=$, go up and highlight Plot1 and press ENTER.
c. Press ZOOM and select ZoomStat.
6. Push STAT and move over to the CALC menu.
7. Select the type of regression.
8. Make sure the Xlist: is L1, the Ylist: is L2, the FreqList: is blank, and the Store RegEQ: is Y1.
a. Get Y1 by pressing VARS and select Y-VARS menu.
b. Select Function....
c. Select Y1.
9. Press Calculate
10. The calculator will display the equation. To see the graph of the points and line, press GRAPH.

## Finding Linear Regression on a NumWorks graphing calculator

1. On the home screen select Regression.
2. In the Data tab, enter the points.
3. Move to the Graph tab.
4. The default is a linear regression and is displayed at the bottom of the screen. To change the regression type
a. Press OK.
b. Select Regression.
c. Select the desired regression type.

Find a polynomial function passing through $(1,-2),(2,2),(3,12),(4,28),(5,50),(6,78)$

## Best-Fitting Polynomial Models

1. Real-life usually $\qquad$ fit a model $\qquad$ so finite differences $\qquad$ work.
2. Use a $\qquad$ find regressions of $\qquad$ degrees.
3. Choose the one that seems to fit the data the best as shown on the $\qquad$ .
217 \#1, 3, 5, 7, 9, 11, 13, 14, 17, 19, Mixed Review = 15
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