Name: _____ Date: _____ Period: _____

4.9 Modeling with Polynomial Functions CYU

CONCEPTS	BASIC	INTERMEDIATE	ADVANCED
Writing a polynomial function from a graph	1	2	3
Use finite difference to determine the degree	4, 6	5, 7	11
Use the degree to write the polynomial function	4, 6	5, 7	
Error Analysis		8	
Writing a polynomial function from coordinates	6	7, 8	
Using the calculator to create a model	9	10	

Write a cubic function whose graph is shown. Show all work to earn full credit.

1.

2.

3.
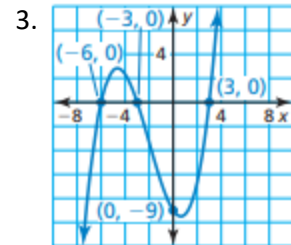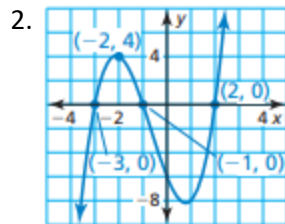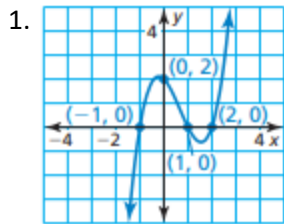
Use finite differences to determine the degree of the polynomial function that fits the data. Then use technology to write the polynomial function.

4.

x	−6	−3	0	3	6	9
f(x)	−2	15	−4	49	282	803

5.

x	−1	0	1	2	3	4
f(x)	−14	−5	−2	7	34	91

6. (- 4, - 317), (- 3, - 37), (- 2, 21), (- 1, 7), (0, - 1), (1, 3), (2, - 47), (3, - 289), (4, - 933)

7. (- 6, 744), (- 4, 154), (- 2, 4), (0, - 6), (2, 16), (4, 154), (6, 684), (8, 2074), (10, 4984)

8. **ERROR ANALYSIS:** Describe and correct the error in writing a cubic function whose graph passes through the given points.

$(-6, 0), (1, 0), (3, 0), (0, 54)$

$54 = a(0 - 6)(0 + 1)(0 + 3)$

$54 = -18a$

$a = -3$

$f(x) = -3(x - 6)(x + 1)(x + 3)$

9. **MODELING WITH MATHEMATICS:** The table shows the ages of cats and their corresponding ages in human years. Find a polynomial model for the data for the first 8 years of a cat's life. Use the model to estimate the age (in human years) of a cat that is 3 years old.

Age of cat, x	1	2	4	6	7	8
Human years, y	15	24	32	40	44	48

10. **MODELING WITH MATHEMATICS:** The data in the table show the average speeds y (in miles per hour) of a pontoon boat for several different engine speeds x (in hundreds of revolutions per minute, or RPM's). Find a polynomial model for the data. Estimate the average speed of the pontoon boat when the engine speed is 2800 RPMs.

x	10	20	25	30	45	55
y	4.5	8.9	13.8	18.9	29.9	37.7

11. **MAKING AN ARGUMENT:** Your friend states that it is not possible to determine the degree of a function given the first-order differences. Is your friend correct? Explain your reasoning.

CYU Reflection: *How far can you go: basic, intermediate, or advanced?*
Rate your mastery level!
How confident are you with the skills this CYU covered? Circle the score you would give yourself.

1	2	3	4	5	6	7	8
Basic		Intermediate			Advanced		Solved ALL!