ALGEBRA RH **HW**

1. Match each description below to its corresponding scatter plot.

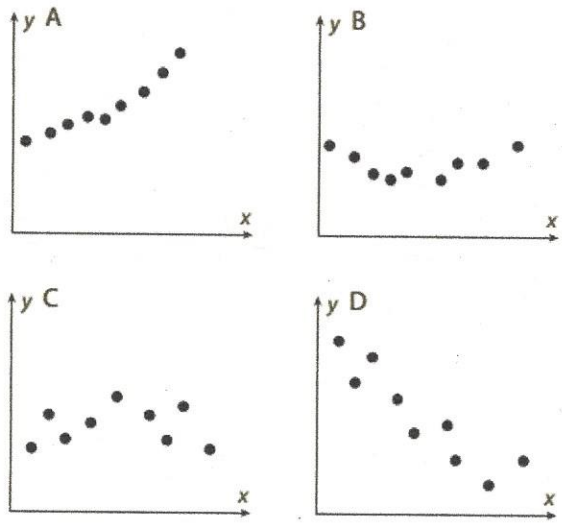
I. quadratic, $a > 0$ B

II. quadratic, $a < 0$ C

III. linear, $a < 0$ D

IV. exponential, $b > 1$ A

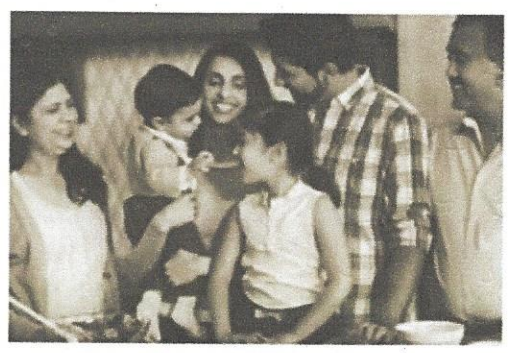
V. exponential, $b < 1$



2. Create a scatter plot, find the best regression model and answer the questions below.

Population Demographics The data set shows the number of Americans living in multigenerational households.

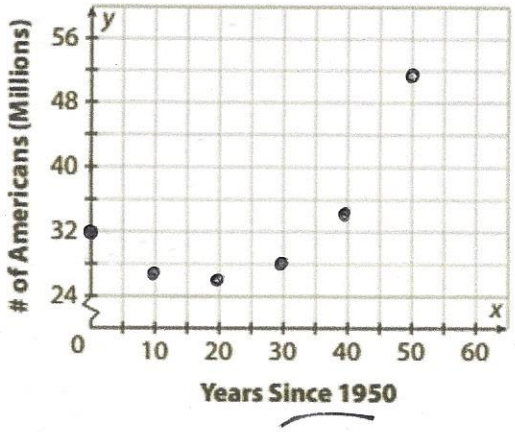
	Year	Number (in Millions)
0	1950	32
10	1960	27
20	1970	26
30	1980	28
40	1990	35
50	2000	42
60	2010	52



quadratic regression model

What does the model predict for the number in 2020? in 2040? Are these numbers reasonable? Explain. $x = 70$ $x = 90$

$y = 0.0148809524x^2 - 0.5392857143x + 31.4047619$



To predict for 2020, $x = 70$ (substitute in equation)

To predict for 2040, $x = 90$

The model predicts that in 2020 there will be approximately 67 million Americans living in multigenerational households and in 2040, 103 million Americans. The numbers are not reasonable because the assumption is a very high increase in population and changing households.

3. Create a scatter plot, find the best regression model and answer the questions below.

Cycling The data set shows the inseam length for different frame sizes for road bicycles.

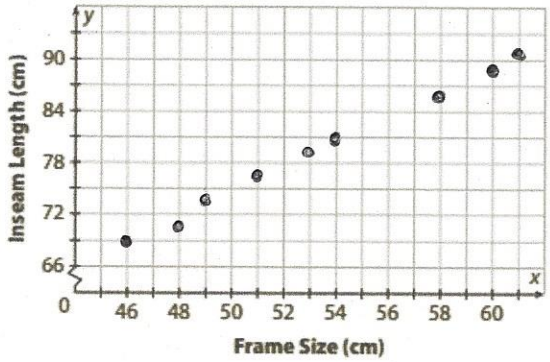
Frame Size (cm)	Inseam Length (cm)
46	69
48	71
49	74
51	76
53	79
54	81
58	86
60	89
61	91

best regression model is linear. As the frame size increases, the inseam length increases at a fairly constant rate.

$y = 1.454022989x + 2.00766...$

$y = 1.454x + 2.008$

Jarrell has an inseam of 84 cm, but the table does not give a frame size for him. He graphs the model on a graphing calculator and finds that a y-value of 84 is closest to an x-value of 56. He decides he needs a 56 cm frame. Do you think this is a reasonable conclusion. Explain.



inseam of 84cm

$y = 84$

$84 = 1.454x + 2.008$

$81.992 = 1.454x$

$x = 56.39064649$

Jarrell's conclusion is reasonable.

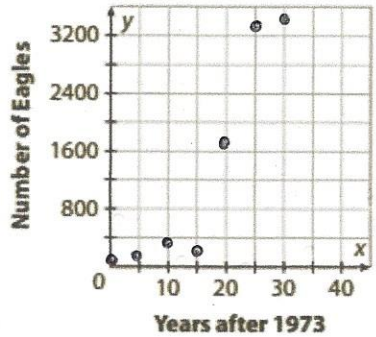
4. Create a scatter plot, find the best regression model and answer the questions below.

Animal Migration The data set shows the number of bald eagles counted passing a particular location on a migration route. Predict the number of bald eagles in 2033. How much confidence do you have in this prediction?

$\hookrightarrow x = 60$

best regression model - exponential
increases rapidly

	Year	Number of Eagles
0	1973	41
5	1978	79
10	1983	384
15	1988	261
20	1993	1725
25	1998	3289
30	2003	3356



I do not have confidence in the prediction.

$y = 44.93692287(1.171625723)^x$

$y = 44.94(1.17)^{60}$

$\approx 554{,}351$

This is not reasonable to have over half a million eagles pass that location. Predators and the environment will keep the number of eagles lower.