Accelerated Coordinate Algebra

Name KEY

Comparing Residuals Worksheet

1. Is there a relationship between the fat grams and the total calories in fast food? The chart below shows the total fat and calories for fast food items.

Total Fat (g)	Total Calories
9	260
13	320
21	420
30	530
31	560
31	550
34	590
25	500
28	560
20	440

a. Calculate the Linear Regression Model for the Data. (round to two decimal places)

$y = 13.20x + 153.60$

b. Calculate the Exponential Regression Model for the Data (round to two decimal places)

$y = 211.97(1.03)^x$

c. Find the residuals for each model. (round to one decimal place)

Linear Regression

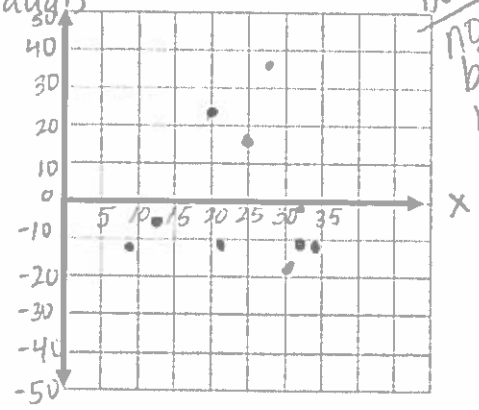
Total Fat	Total Calories	Predicted Value	Residual Value
9	260	272.4	−12.4
13	320	325.2	−5.2
21	420	430.8	−10.8
30	530	549.6	−19.6
31	560	562.8	−2.8
31	550	562.8	−12.8
34	590	602.4	−12.4
25	500	483.6	16.4
28	560	523.2	36.8
20	440	417.6	22.4

Exponential Regression

Total Fat	Total Calories	Predicted Value	Residual Value
9	260	276.6	−16.6
13	320	311.3	8.7
21	420	394.3	25.7
30	530	514.5	15.5
31	560	529.9	30.1
31	550	529.9	20.1
34	590	579.1	10.9
25	500	443.8	56.2
28	560	485.0	75
20	440	382.8	57.2

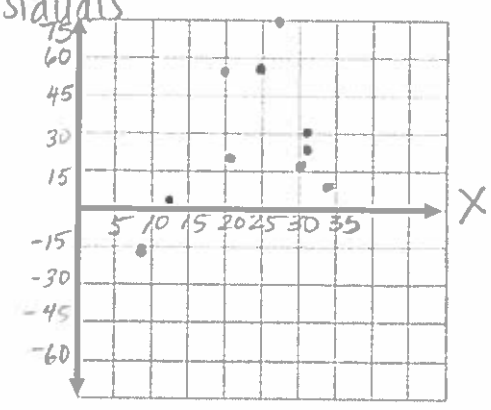
d. Create a residual plot for each model. Use the residual plot to determine which is a better model.

Linear Regression residuals



better model b/c not as big of residuals (#'s)

Exponential Regression residuals



2. A rapidly growing bacteria has been discovered. Its growth rate is shown in the chart.

Hours since observation began	Number of bacteria in the sample
0	20
1	40
2	75
3	150
4	297
5	510

a. Calculate the Linear Regression Model for the Data. (round to two decimal places)

$y = 94.17x - 53.43$

b. Calculate the Exponential Regression Model for the Data. (round to two decimal places)

$y = 20.51(1.92)^x$

c. Find the residuals for each model. (round to one decimal place)

Linear Regression

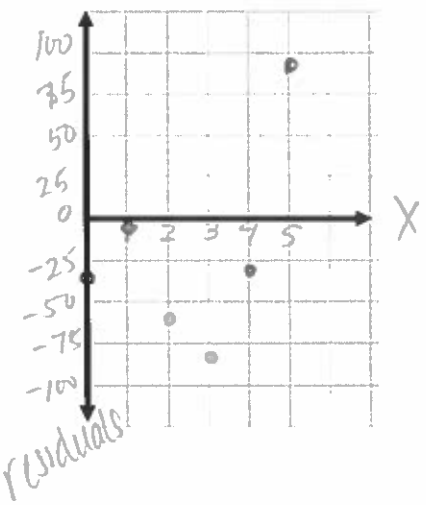
Hours since observation began	# of bacteria	Predicted Value	Residual Value
0	20	-53.4	-33.4
1	40	40.7	-0.7
2	75	134.9	-59.9
3	150	229.1	-79.1
4	297	323.3	-26.3
5	510	417.4	92.6

Exponential Regression

Hours since observation began	# of bacteria	Predicted Value	Residual Value
0	20	20.5	-0.5
1	40	39.4	0.6
2	75	75.6	-0.6
3	150	145.2	4.8
4	297	278.7	18.3
5	510	535.2	-25.2

d. Create a residual plot for each model. Use the residual plot to determine which model is a better fit.

Linear Regression



Exponential Regression

Better model