

Modeling (Days 1 & 2)

**ALL MODELS ARE WRONG,
SOME MODELS ARE USEFUL!**

Goals:

- Find linear, exponential, logarithmic and power models
- Determine most appropriate model using r and residual plots as well as context as criteria

Nov 13-7:06 PM

x	y	Y1(x) predicted y-value	Is the actual y-value above or below the predicted y-value?	Actual y – predicted (residual)	
1	22				<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small; margin-right: 5px;">residual</div> </div>
2	13				
3	7				
4	2				
5	1				

Nov 21-12:52 PM

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1:1-Var Stats
2:2-Var Stats
3:Med-Med
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5:QuadReg          y = axb
6:CubicReg         y = abx
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Nov 15-5:43 AM

As you work through these problems, make conjectures about

- the value of r
- the role of the residual plot (observed - expected)

How can each of these assist you in determining the most appropriate model?

Nov 13-7:10 PM

1. day 1 #1.84state

x	y
1.5	11.5
2.0	20.0
3.9	72.4
4.1	84.5
4.6	104.2

	Linear	Exponential	Logarithmic	Power
equation				
r				
graph				
residual plot				

Nov 13-7:13 PM

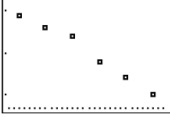
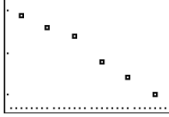
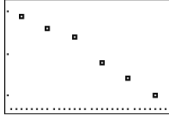
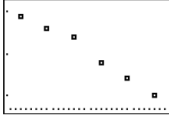
Tyler drops a ball from various heights and records the time that it takes for the ball to hit the ground. The independent variable is time (seconds), the dependent variable is distance (meters).

- How does this model compare to the physical model $s = \frac{1}{2}gt^2$? What is Tyler's estimate of g ? (It is known that the acceleration due to gravity is approximately 9.8 meters/sec².)
- Predict the height from which the ball was dropped if it took 3.9 seconds to reach the ground.

Nov 14-6:00 AM

2. day 1 #2.84state


x	y
1980	15.9
1985	15.6
1990	15.4
1995	14.8
2000	14.4
2005	14.0

	Linear	Exponential	Logarithmic	Power
equation				
r				
graph				
residual plot				

Nov 13-7:26 PM

The table shows the number of live births per 1000 women aged 15-44 years in the United States, starting in 1980.

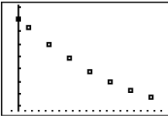
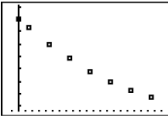
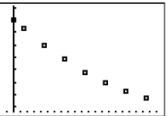
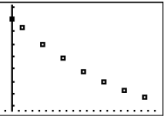
- Identify and interpret the slope of the line.
- Identify and interpret (if reasonable) the y-intercept.
- In 1978 the birthrate was actually 15.0. How close did your model come to this value?
- Predict the birthrate for 2015.
- Predict the birthrate for 2030.



Nov 14-6:01 AM

3. day 1 #3.84state


x	y
0	10
1.5	9.3
4.5	7.9
7.5	6.8
10.5	5.8
13.5	5.0
16.5	4.3
19.5	3.7

	Linear	Exponential	Logarithmic	Power
equation				
r				
graph				
residual plot				

Nov 13-7:26 PM

The table gives the amount of insulin in the blood after a particular amount of time (minutes) has elapsed.

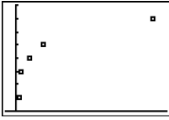
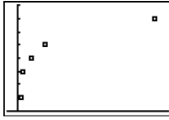
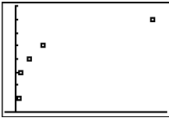
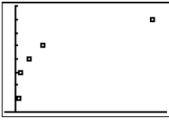
- What does the value of a in your model tell you?
- What does the value of b in your model tell you?
- When would you expect the insulin level to drop to 2.0?
- When would you expect the insulin level to drop to 0.0?



Nov 14-6:01 AM

4. day 1 #4.84state

x	y
20	4
40	6
100	7
200	8
1000	10

	Linear	Exponential	Logarithmic	Power
equation				
r				
graph				
residual plot				

Nov 13-7:26 PM

The table displays the results of the High-Low game. An individual picks a number from 1 to n and the other person guesses until they get the correct number. (After each guess the individual is told whether the guess is too high or too low.) " n " is the independent variable; the dependent variable is the number of guesses made until they were correct. How many guesses would one expect to make if the number was from 1 to 1,000,000?

Nov 14-6:02 AM