

NAME: _____

MATH 1470 Fall 2003 Tintera

TEST 1: Basic Models. Covers Chapters 0-3

You may use calculators and one 8.5 by 11 inch page of notes. Please show all work on this test booklet. Partial credit is awarded only for work shown. Each problem is worth as indicated. Good luck!

In questions 1 – 3, select the best answer by circling the letter marking it.

1. What is used to compare how close a model comes to the actual data?

- a) correlation
- b) residuals
- c) point slope form for a line
- d) use median instead of average

2. A modeler starts with a table of data with one column for t (= years since 1990) and one column for y (= number of pickups stolen in Texas). She adds the following columns to her table: one for t -squared, one for $t*y$, and one for y -squared. Of the three additional columns, which are needed for the calculating r , correlation coefficient:

- a) $t*y$ and t -squared and y -squared
- b) t -squared and $t*y$
- c) $t*y$ and y -squared
- d) t -squared and y -squared

3. Which of the following is true about residuals?

- a) All residuals are non-negative.
- b) A model that passes through a given point has residual = 1.
- c) Residuals can only be calculated for linear models.
- d) The smaller a residual, the closer the model is to the given data point.

4. In an article in today's Corpus Christi Caller-Times, it was reported that the Gross Domestic Product (value of all newly created products and services as measured in dollars) for the USA is increasing at a rate of 3.3%. If the GDP continued to grow at that same rate of 3.3%, how long would it take the GDP to double in size from today's value?

In questions 4 through 6, identify each scenario below as appropriate for a linear or exponential model or neither. Be sure to justify your selection. If a linear model or exponential model is appropriate, write it in a formula with a complete definition of the variables.

4. The number of fans attending Islander basketball games was 500 in 2001 and has been increasing by 200 per year.

Model type, with justification:

Model formula

5. The number of nacho cheese trays served at Islanders basketball games rose from 150 in 2001 to 230 in 2003 but fell last year to 180.

Model type, with justification:

Model formula:

6. The number of cars in the parking lot at Islander basketball games was 138 in 2001 and has risen by 12% per year.

Model type, with justification:

Model formula:

7. A spreadsheet is built to model energy usage at the Tintera household. Predictions are made using an exponential model. For the cells with ? marks, write formulas in the space provided as they would appear in Excel. Where appropriate, a formula should be written in such a way that it can be copied to other cells.

	A	B	C	D
1		k	?	
2		a		
3	Jan = 0	Avg Kwh/day	Predicted	
4	Month	Energy Usage	Energy usage	Residuals^2
5	0	11.9		?
6	1	13.2		
7	?	13.9	?	
8	3	14.5		
9			RMSR	?

A7:

C2 (where k is as in Method 1):

C7:

D5:

D9:

8. The following problem models the Tintera's energy usage for January through May. The data is given in the table below. The variable t is the months since January and y is the energy usage (in Average Kwh per day).

t	Y
0	12.4
1	13.2
2	13.9
3	14.5
4	15.2

a) For the data above, decide if an exponential model is appropriate. Justify your answer.

b) Regardless of your answer to (a), estimate an exponential model for the data set above. Be sure to identify the variables.

c) Using your model, predict the Average Kwh per day for June (the 5th month since January). (Use $y = 12.5(1.05)^t$ if you don't have a model from (b)).

d) The actual Average Kwh per day for June was 36.2. Calculate the residual for that prediction.