**HW 2 – Choosing a Model and Residual Values**  Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Suppose Ralph’s exam grade can be determined by an equation, where *x* is the number of hours he studied and *y* is the grade. The table of information is given below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Hours | 0 | 2 | 4 | 6 | 8 | 10 |
| Grade | 42 | 74 | 90 | 90 | 74 | 42 |

1. According to the table, find the LSRL and that models the grade “ *y*” after the number of hours “*x*” studied.

LINEAR: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ QUADRATIC:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ EXPONENTIAL:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 b. Which equation is best fit?

c. According to the table above, what is the highest grade that Ralph can earn on his exam? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. Enter your equation from part (a) in your calculator and find the **vertex.** What does the **vertex** represent in this problem? *(you may want to change the Y max in your WINDOW)*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What would be the expected grade earned if Ralph studied for 3 hours? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Which kind of function best models the data in each table? Write the equation and for each and circle which is the best.



LINEAR:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ LINEAR:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_

QUADRATIC:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ QUADRATIC:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_

EXPONENTIAL:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ EXPONENTIAL:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_

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LINEAR:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_

QUADRATIC:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_

EXPONENTIAL:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_

Complete each table using the given LSRL (Round answers to one decimal place). Construct a residual plot.

3. LSRL: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ROUND TO 1 DECIMAL)

|  |  |  |  |
| --- | --- | --- | --- |
| ***x*** | ***y*** | **Predicted Value**  | **Residual Value(y-** |
| 5 | 3 |  |  |
| 10 | 4 |  |  |
| 15 | 9 |  |  |
| 20 | 7 |  |  |
| 25 | 13 |  |  |
| 30 | 15 |  |  |

Does the residual plot suggest a linear relationship? Explain.

4. LSRL: \_\_\_\_\_\_\_\_\_\_\_\_\_ (ROUND TO 1 DECIMAL)



|  |  |  |  |
| --- | --- | --- | --- |
| ***x*** | ***y*** | **Predicted Value**  | **Residual Value(y-** |
| 2 | 5 |  |  |
| 4 | 15 |  |  |
| 6 | 26 |  |  |
| 8 | 23 |  |  |
| 10 | 11 |  |  |
| 12 | 3 |  |  |

Does the residual plot suggest a linear relationship? Explain.

3. LSRL: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ROUND TO 1 DECIMAL)

*\*Be careful when plotting the residuals!*

***Start with x = 50 first***

|  |  |  |  |
| --- | --- | --- | --- |
| ***x*** | ***y*** | **Predicted Value**  | **Residual Value(y-** |
| 100 | 505 |  |  |
| 90 | 406 |  |  |
| 80 | 415 |  |  |
| 70 | 360 |  |  |
| 60 | 305 |  |  |
| 50 | 265 |  |  |



Does the residual plot suggest a linear relationship? Explain.

**Review**

1**.** An unfair coin is weighted so that the probability of a head is 13 and the probability of a tail is 23. The coin is tossed seven times, and the outcome on each toss is independent of that on all of the other tosses.

a. What is the probability that the seven coin tosses produce at least two heads?

b . Exactly two heads?

c. Which is more likely, two heads out of seven or four heads out of seven? Justify your answer.

2. Create a representation of the sample space that will show all of the possible outcomes of two randomly selected numbers between 0 and 8 in which repetition is allowed.

1. Create a probability distribution table for the sum of the two numbers.
2. What is the probability that their sum is less than or equal to five?
3. What is the probability that their sum is greater than or equal to nine?
4. What is the probability that their sum is 6 or 11?
5. What is the probability that their sum is 3 or 7?

3. Each day two out of three teams are randomly selected to participate in a game. What is the probability that team A is selected on at least two of the next three days?

4. What is the fourth term for the expression of 2𝑥3+4 10?

5. A teacher is giving a 7 question true-false quiz. Some of the students were not prepared for the quiz and wanted to know what the probability was for a student to randomly guess at least 5 of the questions correctly to get a passing grade.

1. Design a simulation using appropriate technology and complete the chart below. Complete 30 trials.

|  |  |  |
| --- | --- | --- |
| **Number of correct answers**  | **Tally Marks**  | **Total**  |
| 0  |   |   |
| 1  |   |   |
| 2  |   |   |
| 3  |   |   |
| 4  |   |   |
| 5  |   |   |
| 6  |   |   |
| 7  |   |   |

1. Based on your simulation, what is the probability for a student to randomly guess at least 5 of the 7 questions correctly?
2. Now compare your results with other students. How can you improve upon the results of the simulation?

 6. The table below shows the probability distribution of scores on the AP Calculus AB exam given during May of 2013.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 𝒔 | **1**  | **2**  | **3**  | **4**  | **5**  |
| 𝑃(𝑠)  | .294  | .112  | .173  | .181  | .239  |

1. What is the probability that of a random student will score a 3 or higher?
2. At some universities, you must score a 4 or higher to be awards credit. What is the probability of a random student scoring 4 or higher?
3. 282,814 students took the AP Calculus AB Exam in May of 2013. How many students were not eligible to receive credit at a school that required a score of 3 or higher?
4. How many students could receive credit at school that required a 4 or higher?
5. What was the mean score for this exam?

 7. The student council conducted a poll to determine its activities for the year; 328 students responded to the poll. Part of the survey asked about what dances the student council should organize: Homecoming Dance or a Winter Formal.

|  |  |
| --- | --- |
| **Dance**  | **Votes**  |
| Homecoming  | 158  |
| Winter Formal  | 127  |
| Voted for Both  | 85  |

1. How many students did not vote for either dance?

 Another part of the survey asked about the priorities of the student council. The students were given two options: Changing the dress code or getting more options for lunch in the cafeteria.

|  |  |
| --- | --- |
| **Priority**  | **Votes**  |
| Changing Dress Code  | 257  |
| More options for Lunch  | 198  |
| Did not vote for a priority  | 15  |

1. How many students voted for both priorities?