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State:

H_0: $\beta = 0$ H_a: $\beta < 0$

β_1 represents the true slope of the change in pulse rate over time of Professor Moore after swimming 2000 yards.

The null hypothesis states that there is no relationship between swim time and pulse rate of Professor Moore after he swims 2000 yards. The alternative hypothesis says there is a negative relationship between swim time and Mr. Moore's pulse rate.

Plan:

Linear Regression *t* Test, also called *t* Test for the Slope

Conditions:

Linear: As can be seen in figure 1 the data has a negative linear trend and then in figure 2 below, the residuals show now left over pattern therefore it can be said that the relationship between x and y is linear.

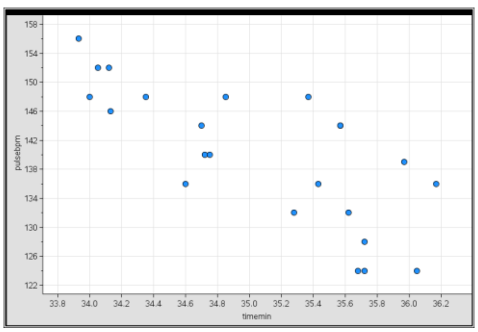

Figure 1. Time vs. Pulse Rate data

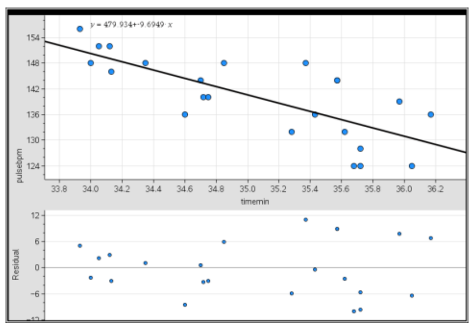

Figure 2. LSRL and Equation and Residual Plot

Independent: The sample size n = 23 < 10% of all days when Professor Moore swims 2000 yards.

Normal: The histogram of residuals shown below, shows no strong skewness or outliers. Therefore, for any fixed value of time in minutes Mr. Moore spent swimming 2000 yards, his pulse rate in beats per minute varies according to a normal distribution. (the response y values vary normally for each fixed x value)

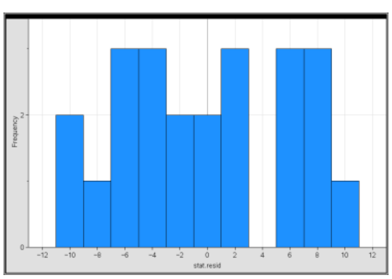

Figure 3. Histogram of Residuals

Equal Standard Deviations: The residual plot shows that the standard deviation of the pulse rates might be a little smaller for the smaller values of time (x), but not too bad and it's hard to tell with so few data points.

And

Random: Mr. Moore's pulse rate was taken on 23 random days after swimming 2000 yards.

<u>Do</u>:

$t = \frac{b}{SE_b}$

"t" = -5.133205700167

"PVal" 0.00002

<u>Conclude</u>:

Reject H_0 because P-value < α level of 0.05. There is convincing evidence of a negative linear relationship between swim time and pulse rate in the population of days when Professor Moore swims 2000 yards. If H_0 is true, there is almost no chance in getting the change in pulse rate per min (the slope) this extreme or more by chance alone.