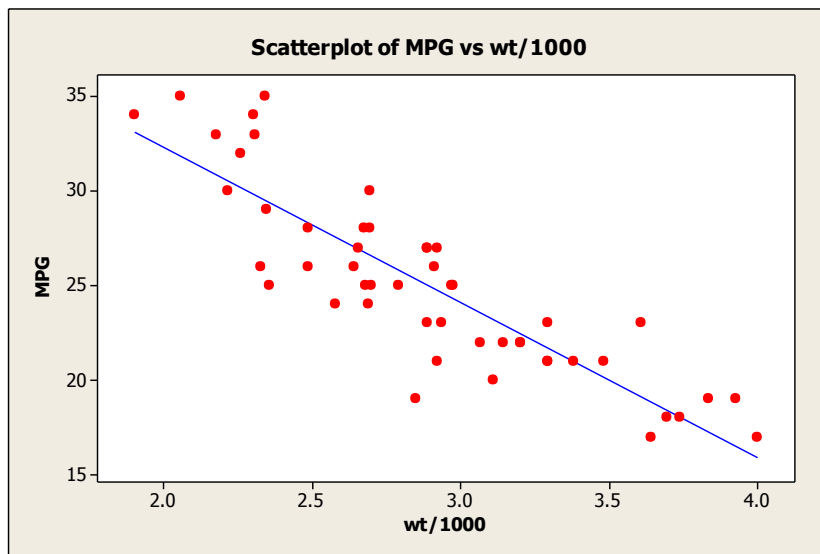


Name _____

Period _____

T-Tests for Regression
AP Statistics - HW #3

1. A consumer organization has reported test data for 50 car models. We will examine the association between the weight of the car (in thousands of pounds) and the fuel efficiency (in miles per gallon). Shown are the summary statistics, scatterplot and regression analysis:



Regression Analysis: MPG versus wt/1000

The regression equation is
 $MPG = 48.7 - 8.21 \text{ wt}/1000$

Predictor	Coef	SE Coef	T	P
Constant	48.739	1.976	24.67	0.000
wt/1000	-8.2136	0.6738	-12.19	0.000

S = 2.41337 R-Sq = 75.6% R-Sq(adj) = 75.1%

Descriptive Statistics: MPG

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
MPG	50	0	25.020	0.684	4.834	17.000	21	25	28	35

Descriptive Statistics: wt/1000

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
wt/1000	50	0	2.8878	0.0724	0.5117	1.9000	2.4850	2.8850	3.2238	4.0000

Use the output to answer the questions 1-7 which follow on the next page.

1. Based on the scatterplot, describe the relationship (three things).
2. Report the equation of the least-squares regression line in context and the correlation. **Report only these two items, nothing else!**
3. Explain in words what the slope β of the true regression line says about the weight of the car and its fuel efficiency.
4. What is the estimate of β from the data? What is your estimate of the intercept α of the true regression line? Interpret the estimate for β in context.
5. Report the estimate for σ .
6. Calculate SE_b .
7. Determine a 90% confidence interval to estimate the true slope (β) of the relationship between the weight of a vehicle and its fuel efficiency. **Include all required elements.** Does there appear to be a relationship?

Use the following scenario to answer questions 8 - 11. Use a separate sheet of paper.

Researchers wondered if temperature might influence the age at which babies learn to crawl. Data was collected on 208 boys and 206 girls. Parents reported the month of the baby's birth and the age (in weeks) at which their child first crawled. The table gives the average temperature ($^{\circ}\text{F}$) when the babies were 6 months old and the average crawling age (in weeks) for each month of the year.

Birth Month	6-Month Temperature	Average Crawling Age
January	66	29.84
February	73	30.52
March	72	29.70
April	63	31.84
May	52	28.58
June	39	31.44
July	33	33.64
August	30	32.82
September	33	33.83
October	37	33.35
November	48	33.38
December	37	32.32

8. Would this association appear to be weaker, stronger, or about the same if data had been plotted for individual babies instead of using monthly averages? Explain.
9. Does this data meet the assumptions for inference for regression? State and check them.
10. Is there evidence of an association between Temperature and Crawling Age? Test an appropriate hypothesis and state your conclusions.
11. Create and interpret a 95% confidence interval for the slope of the true relationship.

12. In 2002, *Consumer Reports* listed the price (in dollars) and power (in cold cranking amps) of auto batteries. We want to know if more expensive batteries are generally better in terms of starting power. Here is applicable computer output:

Dependent variable is: Power

R-squared = 25.2%

s = 116.00 with $33 - 2 = 31$ degrees of freedom

Variable	Coefficient	SE (Coefficient)	t-ratio	P-value
Intercept	384.594	93.55	4.11	0.0003
Cost	4.14649	1.282	?	?

- How many batteries were tested?
- What is the equation of the LSRL in context?
- What is the value of the t-test statistic?
- What is the p-value for a linreg t-test?
- Is there evidence of an association between cost and cranking power of auto batteries? Test an appropriate hypothesis and state your conclusion.
- If you find an association in question "d", is it a strong association? Explain.
- Create and interpret a 90% confidence interval for the slope of the true line.