

## UNIVERSITY OF TEXAS AT AUSTIN

## Quiz # 17

Simple linear regression.

Provide your **complete solution** for the following problems.

**Problem 17.1.** (2 points) The term “residual” refers to the difference between the observed response and the predicted response using the regression equation. *True or false?*

**Problem 17.2.** (2 points) The sum of residuals is equal to zero. *True or false?*

**Problem 17.3.** Do heavier cars use more gasoline? To answer this question, a researcher randomly selected 15 cars. He collected their weight (in hundreds of pounds) and the mileage (MPG) for each car. From a scatterplot made with the data, a linear model seemed appropriate. Here is the output created by statistical software:

**Model Summary**

Model	Multiple R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.662	.438	.395	6.780

**Coefficients**

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	40.439	6.275	6.445	.0000
	WEIGHT	-.521	.164	-3.182	.0072

- (i) (2 points) What is the **explanatory** variable in the above study?
- (ii) (5 points) What is the equation of the least-squares regression line?
- (iii) (2 points) We cannot interpret the slope because we cannot have a negative weight of a car. *True or false?*
- (iv) (2 points) We estimate the mileage to decrease by 0.521 miles per gallon when the weight of a car increases by 100 pounds. *True or false?*