Question 3.1

1. A black and blue text

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2. A screenshot of a graph

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   The F-value is relatively high (29.44), and the p-value is very close to zero (0.000). This indicates that the regression model is statistically significant, and there is strong evidence that at least one of the independent variables (x2, x7, x8) is associated with the number of games won.
3. A table of numbers and symbols

   Description automatically generated with medium confidence

x2: T-Value=5.18

x7: T-Value=2.20

x8: T-Value=-3.77

Since the P-Values for all three coefficients are >0.05, using α=0.05 we can reject the null hypothesis: H0: β2 = 0, H0: β7 = 0, and H0: β8 = 0.

1. A close-up of a number

   Description automatically generated
2. A graph with a red line

   Description automatically generated

Given a p-value of .495, we can conclude that the observed partial F-statistic is not statistically significant at conventional significance levels (e.g., α = 0.05). Therefore, we fail to reject the null hypothesis. This suggests that the inclusion of the variable x7 does not significantly improve the model. The partial F-test and the t-test for β7 both assess the significance of the variable x7 in the model.

Regarding the relationship between the partial F-statistic and the t-test for β7 calculated in part c above: The t-test for β7 examines the significance of the coefficient for x7 in the full model, while the partial F-test assesses whether the inclusion of x7 significantly improves the overall model.

In both cases, a low p-value (typically less than 0.05) would indicate that x7 is a significant predictor. However, in our specific analysis, neither the t-test nor the partial F-test showed statistical significance for x7, suggesting that it may not be a significant contributor to the model.

Question 3.2

I did the calculations with a list on my calculator, but the above is the formula I used to numerically calculate . MiniTab gave an value of 78.63. I’m assuming that this is some kind of rounding issue, since the values are very close. Let me know if I’m mistaken.

Question 3.3

1. X7 coefficief=0.1940.

X7 SE=0.000695

degrees of freedom equal to the residual degrees of freedom from regression=n−p=27-3=24.

critical t-value = 2.064

Margin of Error= critical t-value \* 0.000695=2.064\*0.000695=0.00143448  
CI=(X7 coefficief-MoE, X7 coefficief+MoE)=(0.194-0.00143448, 0.194+0.00143448)  
=(0.19256552, 0.19543448)

)=

Critical t-value = 2.064

Margin of error=2.064())=2.064\*1.492959668=3.081468755

Confidence Interval = (

Question 3.4

1. A table of numbers and letters

   Description automatically generated with medium confidence

Given the p-value of 0.000, we can reject our null hypothesis that the model with predictors does not provide a statistically significant improvement over the null model (i.e., all coefficients are zero).

1. A screenshot of a computer

   Description automatically generated

R-sq and R-sq(adj) are much lower in this model than in the initial model with 3 predictors. In the first model, R-sq=78.63% and R-sq(adj)=75.96%.

1. **95% Confidence Interval on β7:**  
   X7 coefficief=0.048

X7 SE=0.119

n−p=27-2=25

critical t-value = 2.06

Margin of Error= critical t-value \* 0.119=2.06\*0.119=0.24514  
CI=(X7 coefficief-MoE, X7 coefficief+MoE)=(0.048-0.24514, 0.048+0.24514)  
=(-0.19714, 0.29314).

Length of CI is .49028. Length of prior ci was .00287, this one is longer.

(cont…)

**95% CI on the mean number of games won by a team when x7 = 56.0 and x8 = 2100:**

)=

Critical t-value = 2.06

Margin of error=2.06())=2.06\*=3.838531595

Confidence Interval = (

Length of this ci is 7.677. Length of prior one was 6.162937505. This one is longer.

1. First, finding a lower R-Sq value shows that less of the variability in our response variable can be predicted by our second model than in our first. Additionally, finding a wider confidence interval for a regression coefficient in a model after omitting an important predictor variable highlights the potential pitfalls of omitting relevant variables.

Question 3.5

* 1. A close up of a number

     Description automatically generated
  2. A table of numbers and letters

     Description automatically generated with medium confidence

The F-value is relatively high (29.44), and the p-value is very close to zero (0.000). This indicates that the regression model is statistically significant, and there is strong evidence that at least one of the independent variables (x1, x6) is associated with gasoline mileage.

(cont…)

* 1. **This Model:**

A close-up of a graph

Description automatically generated

**The model from 2.4 problem:**

**A close-up of a number

Description automatically generated**

This model has a higher R-sq and R-sq(adj)

* 1. X1 coefficief=-0.05302

X1 SE=1.54

n−p=31-2=29

critical t-value = 2.045

Margin of Error= critical t-value \* X1 SE =2.045\*1.54=3.1493  
CI=(X1 coefficief-MoE, X1 coefficief+MoE)=(-0.05302-3.1493, -0.05302+3.1493)  
=(-3.20232, 3.09628)

* 1. A screenshot of a computer

     Description automatically generated

Based on the P-Values in the table above, we can reject the null hypothesis that β1=0. However, the p-value for β6>0.05, so we fail to reject the null hypothesis that β6=0.

)=

Critical t-value = 2.045

Margin of error=2.045())=2.06\*=0.5608063882

Confidence Interval = (

* 1. I cannot figure the last two parts out. I tried to follow the example from the book, like you said, but I am stuck on trying to understand the notation. I understand if we cannot meet to discuss, so I will try to figure it out independently and hopefully get it right on the corrections. Thanks.