Quiz 7

From the software output below,

COMPLETE MODEL

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	5	148526859	29705372	93.55	0.000
Error	61	19370350	317547		
Total	66	167897208			

Model Summary

S	R-sq	R-sq(adj)
563.513	88.46%	87.52%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value
Constant	15583	1143	13.63	0.000
RPM	0.078	0.110	0.71	0.481
CPRATIO	−523	103	−5.06	0.000
RPM_CPR	0.00445	0.00558	0.80	0.428
RPMSQ	−0.000000	0.000002	−0.09	0.927
CPRSQ	8.84	2.16	4.09	0.000

Regression Equation

HEATRATE = 15583 + 0.078 RPM − 523 CPRATIO + 0.00445 RPM_CPR − 0.000000 RPMSQ + 8.84 CPRSQ

REDUCED MODEL

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	3	142586570	47528857	118.30	0.000
Error	63	25310639	401756		
Total	66	167897208			

Model Summary

S	R-sq	R-sq(adj)
633.842	84.92%	84.21%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value
Constant	12065	419	28.83	0.000
RPM	0.1697	0.0347	4.89	0.000
CPRATIO	−146.1	26.7	−5.48	0.000
RPM_CPR	−0.00242	0.00312	−0.78	0.440

Regression Equation

HEATRATE = 12065 + 0.1697 RPM − 146.1 CPRATIO − 0.00242 RPM_CPR

Exercise 7.1. What is the reduced model?

- ☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \beta_4 x_1^2 + \beta_5 x_2^2 + \epsilon$
- ☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon$
- ☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \epsilon$

☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1^2 + \epsilon$

Exercise 7.2. What is the full model?

☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \beta_4 x_1^2 + \beta_5 x_2^2 + \epsilon$
☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon$
☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \epsilon$
☐ $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1^2 + \epsilon$

Exercise 7.3. What is the SSE_R? That is, the SSE of the reduced model.

Exercise 7.4. What is the SSE_F? That is, the SSE of the full model.

Exercise 7.5. Which one is the correct formula to cauclate the F-statistics?

☐ $F = \frac{\frac{25310639-19370350}{2}}{\frac{19370350}{61}}$
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Exercise 7.6. Let $\alpha = 0.1$, what is F_α?

☐ 2.39
☐ 2.18
☐ 3.62
☐ 1.94

Exercise 7.7. What is the conclusion of the Partial F-test?

☐ We prefer the reduced model.
☐ We prefer the full model.