Practical Week 5

Solutions

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.901[a]	.812	.796	.20295

a. Predictors: (Constant), Weight, Citympg2, Horsepower2, EngineSize, Horsepower, Citympg

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.134	6	2.189	53.143	.000[b]
	Residual	3.048	74	.041		
	Total	16.182	80			

a. Dependent Variable: LogPrice

b. Predictors: (Constant), Weight, Citympg2, Horsepower2, EngineSize, Horsepower, Citympg

Coefficients[a]

| Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	3.072	.777		3.954	.000					
	Citympg	-.130	.038	-1.619	-3.408	.001	-.740	-.368	-.172	.011	**88.663**
	Citympg2	.002	.001	1.383	3.350	.001	-.666	.363	.169	.015	**66.897**
	EngineSize	-.171	.061	-.383	-2.820	.006	.731	-.312	-.142	.138	7.229
	Horsepower	.009	.003	.961	2.784	.007	.831	.308	.140	.021	**46.804**
	Horsepower2	-1.481E-5	.000	-.556	-1.973	.052	.757	-.224	-.100	.032	**31.242**
	Weight	.000	.000	.515	2.688	.009	.850	.298	.136	.069	**14.394**

a. Dependent Variable: LogPrice

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	(Constant)	Citympg	Citympg2	EngineSize	Horsepower	Horsepower2	Weight
							Variance Proportions			
1	1	6.204	1.000	.00	.00	.00	.00	.00	.00	.00
	2	.660	3.065	.00	.00	.00	.00	.00	.01	.00
	3	.105	7.693	.00	.00	.01	.04	.00	.05	.00
	4	.026	15.312	.01	.00	.02	.35	.01	.00	.00
	5	.003	49.426	.06	.03	.09	.32	.25	.37	.23
	6	.002	63.452	.00	.00	.01	.24	**.73**	**.58**	.67
	7	.000	135.453	**.93**	**.97**	**.88**	.05	.01	.00	.09

a. Dependent Variable: LogPrice
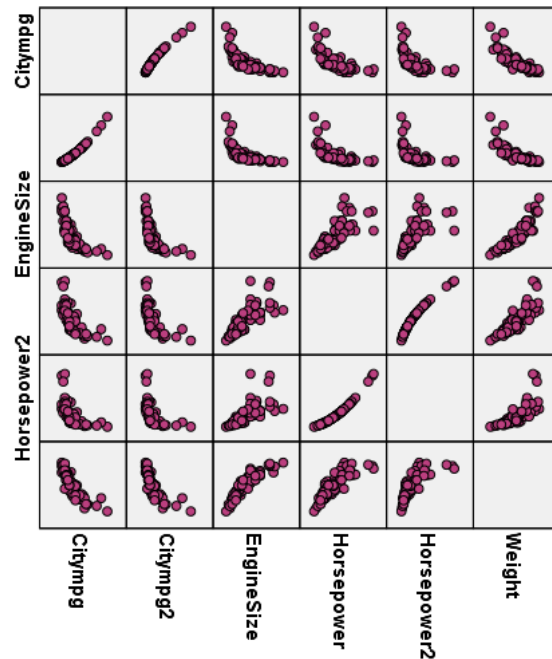
All measures point out to the high collinearity between 2 regressors and their squared values together with Weight.

Centring those regressors will greatly reduce the multicollinearity. You may also drop Weight as it contributes very little to the regression and also has high collinearity with the intercept. The results for the same regression with regressors centred are given below.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	2.028	.378		5.359	.000		
CitympgCent	-.039	.013	-.490	-3.066	.003	.100	10.045
CitympgCent2	.002	.001	.329	3.350	.001	.264	3.793
EngineSize	-.171	.061	-.383	-2.820	.006	.138	7.229
HorsepowerCent	.004	.001	.497	3.584	.001	.132	7.565
HorsepowerCent2	-1.481E-5	.000	-.147	-1.973	.052	.459	2.177
Weight	**.000**	.000	.515	2.688	**.009**	.069	**14.394**

a. Dependent Variable: LogPrice

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions						
				(Constant)	CitympgCent	CitympgCent2	EngineSize	HorsepowerCent	HorsepowerCent2	Weight
1	1	3.511	1.000	.00	.00	.00	.00	.00	.01	.00
	2	2.128	1.284	.00	.02	.03	.00	.02	.00	.00
	3	.938	1.935	.00	.00	.04	.00	.03	.14	.00
	4	.324	3.292	.00	.01	.26	.00	.06	.44	.00
	5	.081	6.588	.00	.56	.38	.00	.48	.26	.00
	6	.017	14.426	.05	.29	.27	.68	.05	.03	.01
	7	.001	**49.701**	**.95**	.11	.01	.32	.36	.12	**.99**

a. Dependent Variable: LogPrice