DATA SCIENCE WITH R

REGRESSION ANALYSIS

Overview

➔ **Simple Linear Regression**

Multiple Linear Regression

Regression Assumptions

Implementation in SAS

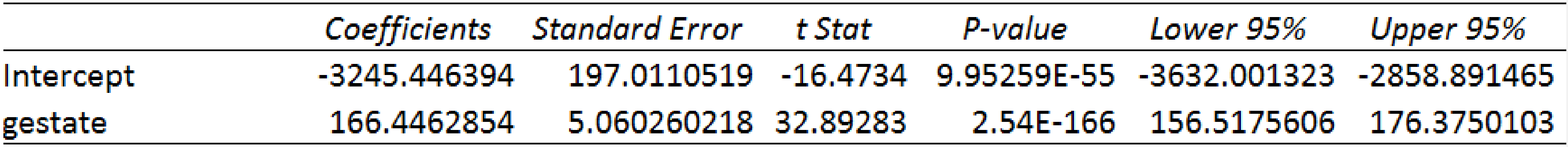
Regression

SIMPLE LINEAR REGRESSION

- ✓ Concepts - OLS
- ✓ How to Run
- ✓ **Interpret Results**

OLS Results: Confidence Levels

The 95% confidence interval tell us – for a 1 week increase in gestation period, we expect to see an increase in birthweight of between 156.5 and 176.4 gms 95% of the time.



	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-3245.446394	197.0110519	-16.4734	9.95259E-55	-3632.001323	-2858.891465
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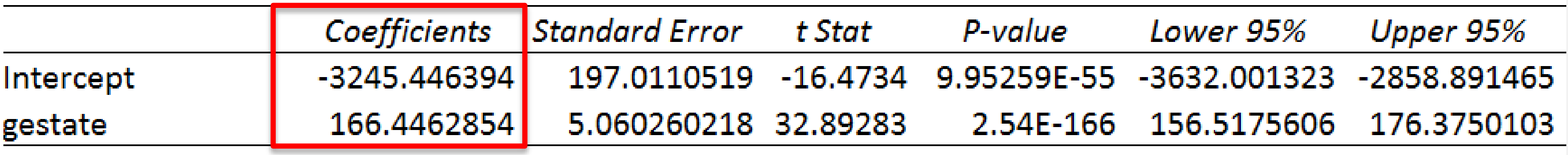

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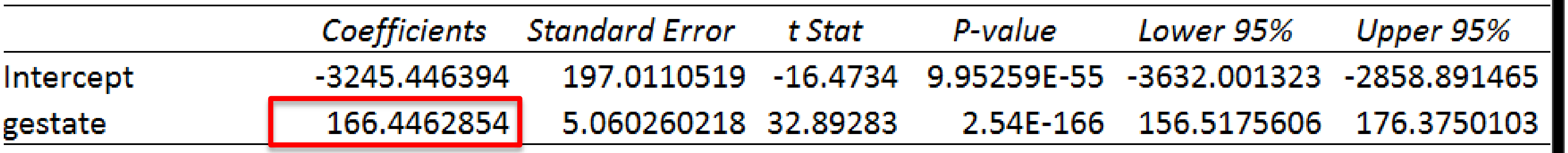

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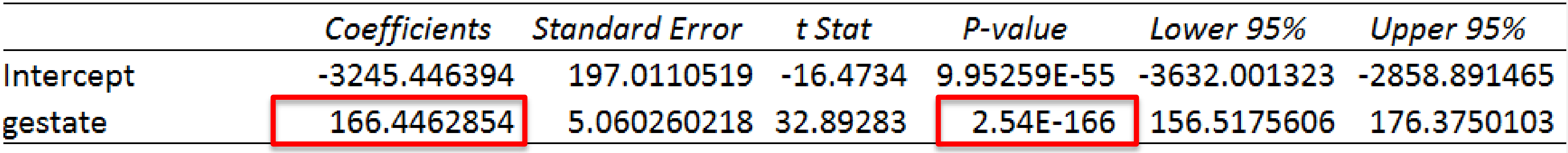

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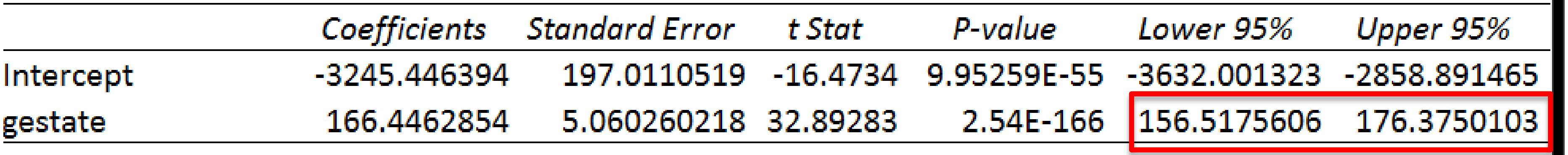

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If we run regression models on multiple random samples from the same population many times, then 95% of the time the point estimate of the coefficient on the independent variable of interest will lie within the lower and upper bounds calculated

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The mathematical calculation is:

$$R^2 \equiv 1 - \frac{SS_{\text{err}}}{SS_{\text{tot}}}$$

Where,

$$SS_{\text{tot}} = \sum_i (y_i - \bar{y})^2$$

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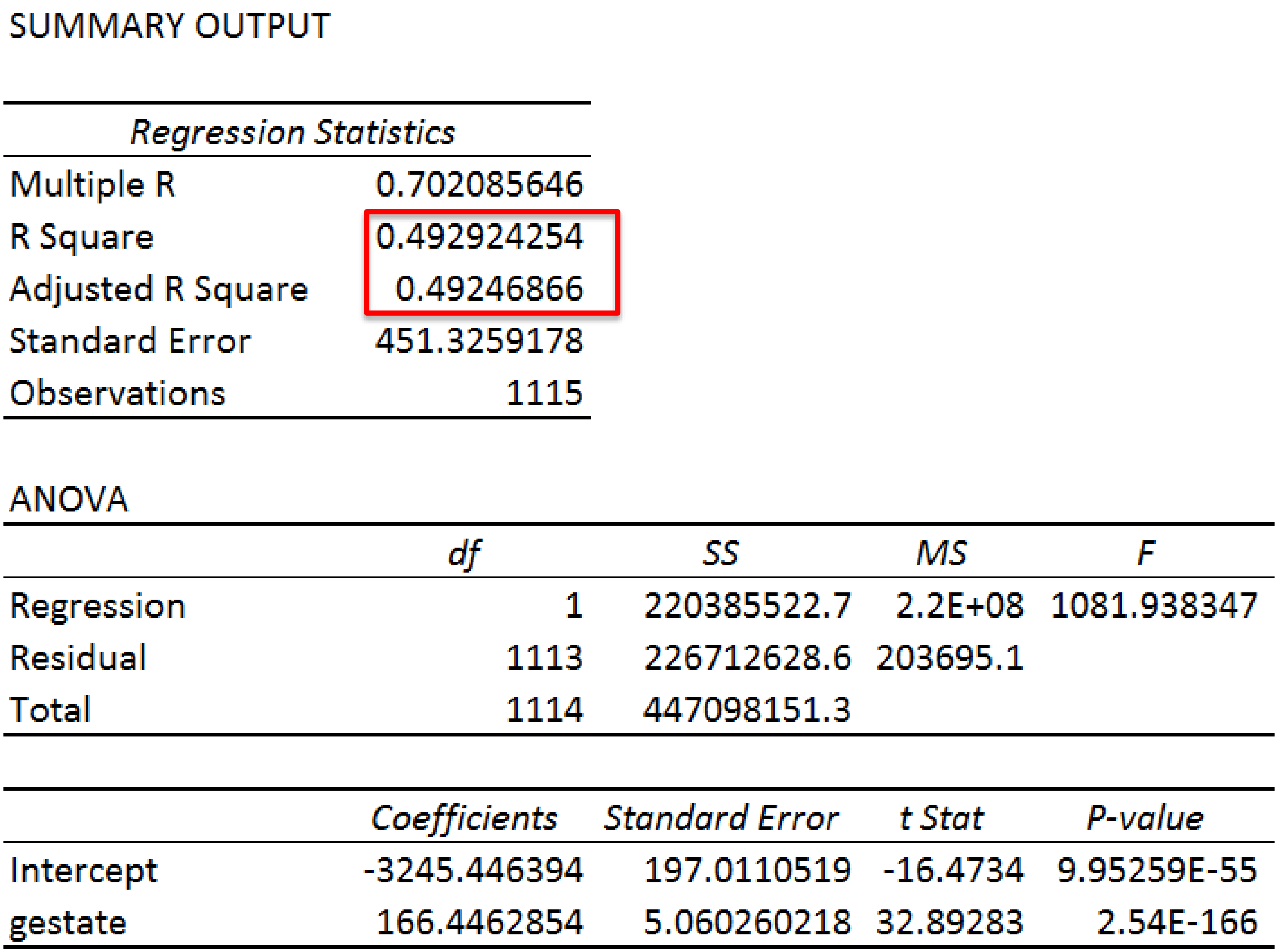
OLS Results Interpretation



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.702085646
R Square	0.492924254
Adjusted R Square	0.49246866
Standard Error	451.3259178
Observations	1115

ANOVA

	df	*SS*	*MS*	*F*
Regression	1	220385522.7	2.2E+08	1081.938347
Residual	1113	226712628.6	203695.1	
Total	1114	447098151.3		

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- However, R^2 is not the only indicator of model fit
- It is possible to have the same R^2 but different models with different fit
- R^2 also increases with addition of variables, whether relevant or not, it is better to use the adjusted R2 measure

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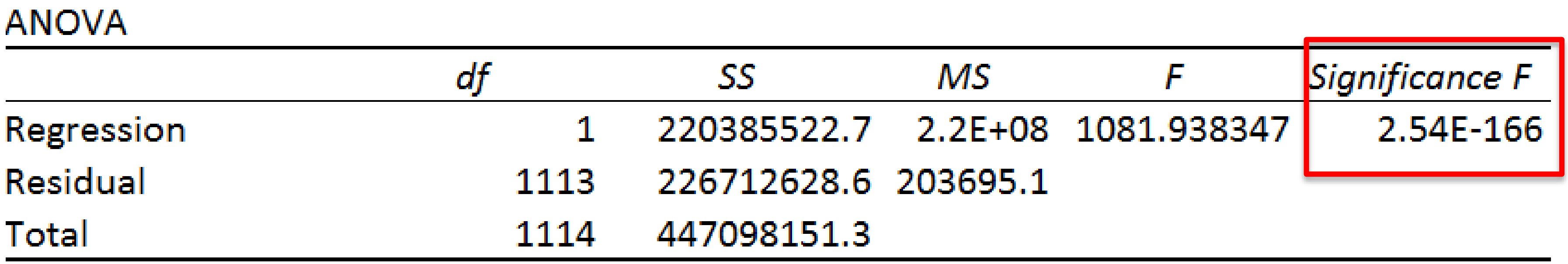

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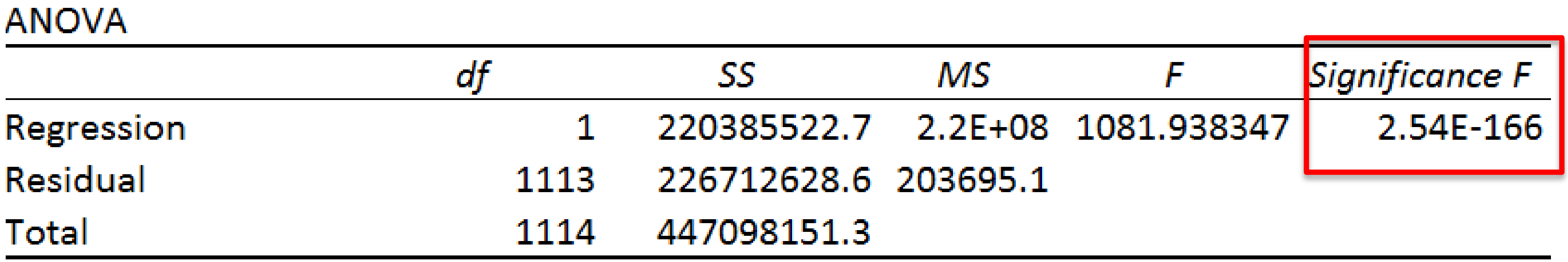

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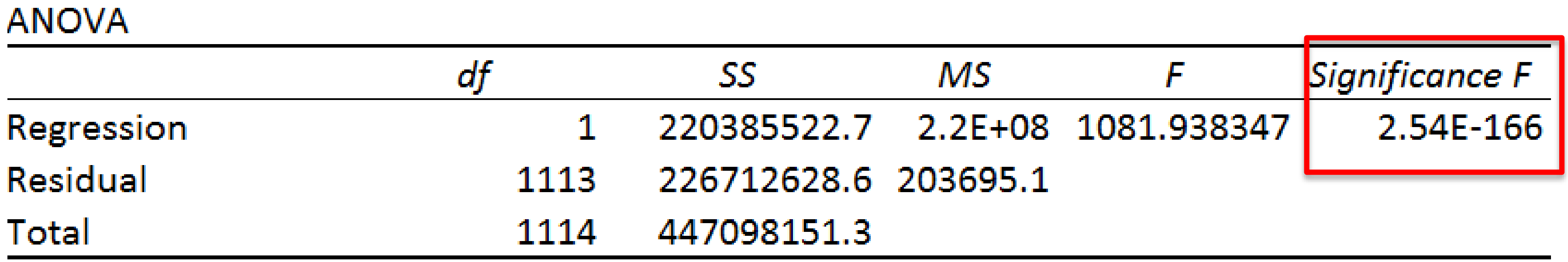

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In this example, p value < 0.05, so we conclude that at least one of the beta coefficients is significant (in this case, we have only one beta)

Coming Up

Regression Analysis

Multiple Linear Regression

THANK YOU