Instructions for carrying out statistical procedures and tests using SPSS

These instructions are closely linked to the author's book:

Essential Statistics for the Pharmaceutical Sciences
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For all references to chapters or tables, see the above book.

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Example: Table 14.6 Rainfall, temperature, sunshine and wind speed at growing sites and concentration of fungal toxin in nuts.

Enter the data into 5 appropriately labelled numeric columns and then follow the menus:

Analyze / Regression / Linear …

Move 'Toxin' into the 'Dependent' box, and all 4 meteorological factors into the 'Independent(s)' box. The key parts of the output will be:

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	139.782	4	34.946	14.106	.006(a)
	Residual	12.387	5	2.477		
	Total	152.169	9			

a Predictors: (Constant), Wind, Rain, Sun, Temp
b Dependent Variable: Toxin

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.608	7.105		4.449	.007
	Rain	7.068	1.003	.913	7.046	.001
	Temp	-.420	.241	-.282	-1.741	.142
	Sun	-.237	.509	-.071	-.467	.660
	Wind	-.794	.298	-.374	-2.666	.045

a Dependent Variable: Toxin

The upper table shows the P value for the overall regression equation (0.006 in the last column), which is clearly significant. The next table shows the P values for each predictor (Final column). Rain and Wind (P values 0.001 and 0.045) make a significant contribution to the regression, but Temp and Sunshine (P = 0.142 and 0.660) have not been established as significant.

We must now remove one predictor. Since Temperature had a P value of 0.142 it has a stronger claim to be retained than Sunshine (P = 0.660). (See Chapter 14). So, repeat the regression, using Rainfall, Temperature and Wind, but omitting Sunshine. The new output is shown on the next page:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.957(a)	.915	.873	1.4678

a Predictors: (Constant), Wind, Rain, Temp

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	139.242	3	46.414	21.543	.001(a)
	Residual	12.927	6	2.155		
	Total	152.169	9			

a Predictors: (Constant), Wind, Rain, Temp
b Dependent Variable: Toxin

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.565	6.625		4.764	.003
	Rain	7.011	.929	.906	7.551	.000
	Temp	-.479	.192	-.322	-2.495	.047
	Wind	-.822	.272	-.387	-3.023	.023

a Dependent Variable: Toxin

The middle table confirms the continuing significance of the overall regression equation (P = 0.001) and the final table (Last column) shows all the predictors as now having P values below 0.05 and therefore significant. We stop at this point.

We now construct the regression equation using the constant and coefficients from the last table. In the column headed ‘B’, you will first find the constant (31.565) and then the coefficients for Rain, Temp and Wind are given as 7.011, -0.479 and –0.822. Hence the regression equation is:

Toxin = 31.565 + 7.011 x Rain – 0.479 x Temp – 0.822 x Wind

The first table provides values for R-square and R-square (adjusted) for the final model as 0.915 and 0.873 respectively. (See Section 14.2.5 for explanation of R-square.)