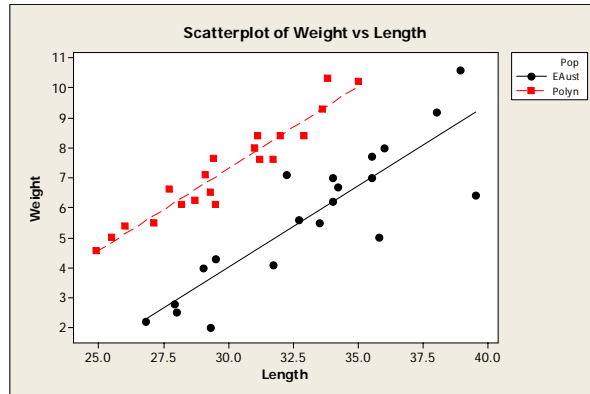


Statistical Ecology Stat 555

Analysis of Covariance

Problem: to determine differences in weight among two populations of snake head cowries.



```
MTB > Describe 'Weight' 'Length';
SUBC> By 'Pop'.
```

Descriptive Statistics: Weight, Length by Pop

Variable	Pop	N	Mean	Median	TrMean	StDev
Weight	EAust	20	5.695	5.900	5.628	2.353
	Polyn	20	7.250	7.350	7.229	1.629
Length	EAust	20	33.100	33.750	33.094	3.761
	Polyn	20	29.885	29.450	29.878	2.846

Variable	Pop	SE Mean	Minimum	Maximum	Q1	Q3
Weight	EAust	0.526	2.000	10.600	4.025	7.075
	Polyn	0.364	4.580	10.300	6.098	8.400
Length	EAust	0.841	26.800	39.500	29.350	35.725
	Polyn	0.636	24.900	35.000	27.825	31.925

Standard One-way ANOVA:

```
MTB > GLM 'Weight' = Pop;
SUBC> Brief 2 .
```

General Linear Model: Weight versus Pop

```
Factor      Type Levels Values
Pop         fixed      2 EAust Polyn
```

Analysis of Variance for Weight, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Pop	1	24.180	24.180	24.180	5.91	0.020
Error	38	155.580	155.580	4.094		
Total	39	179.761				

$$H_0: \mu_1 = \mu_2$$

$$H_A: \mu_1 \neq \mu_2$$

Test for ANCOVA Assumption:

```
MTB > GLM 'Weight' = Pop Length Pop* Length;
SUBC> Covariates 'Length';
SUBC> Brief 2 .
```

H_0 : no L x Population interaction (slopes equal)
 H_A : L x Population interaction (slopes not equal)

General Linear Model: Weight versus Pop

Factor	Type	Levels	Values
Pop	fixed	2	EAust Polyn

Analysis of Variance for Weight, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Pop	1	24.180	0.984	0.984	1.18	0.284
Length	1	125.576	116.629	116.629	139.95	0.000
Pop*Length	1	0.003	0.003	0.003	0.00	0.952
Error	36	30.001	30.001	0.833		
Total	39	179.761				

ANCOVA:

```
MTB > GLM 'Weight' = Pop;
SUBC> Covariates 'Length';
SUBC> Brief 2;
SUBC> Means Pop.
```

General Linear Model: Weight versus Pop

Factor	Type	Levels	Values
Pop	fixed	2	EAust Polyn

Analysis of Variance for Weight, using Adjusted SS for Tests

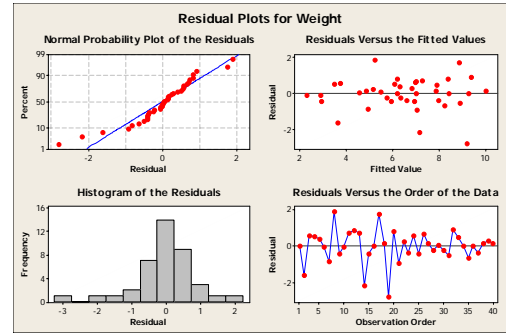
Source	DF	Seq SS	Adj SS	Adj MS	F	P
Length	1	61.856	125.576	125.576	154.85	0.000
Pop	1	87.901	87.901	87.901	108.39	0.000
Error	37	30.004	30.004	0.811		
Total	39	179.761				

S = 0.900516 R-Sq = 83.31% R-Sq(adj) = 82.41%

Term	Coef	SE Coef	T	P
Constant	-10.695	1.387	-7.71	0.000
Length	0.54513	0.04381	12.44	0.000

Least Squares Means for Weight

Pop	Mean	SE Mean
EAust	4.819	0.2133
Polyn	8.126	0.2133



H_0 : L is not a significant covariant
 H_A : L is a significant covariant

H_0 : $\mu_1 = \mu_2$ for population
 H_A : $\mu_1 \neq \mu_2$ for population

