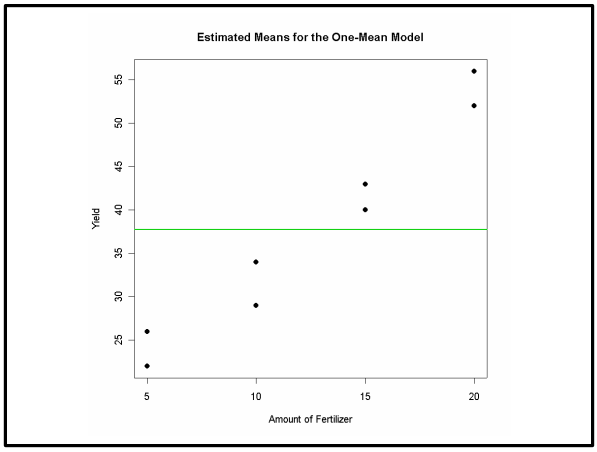
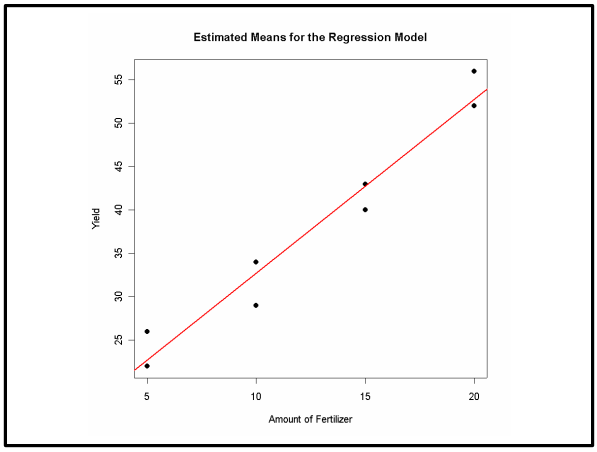
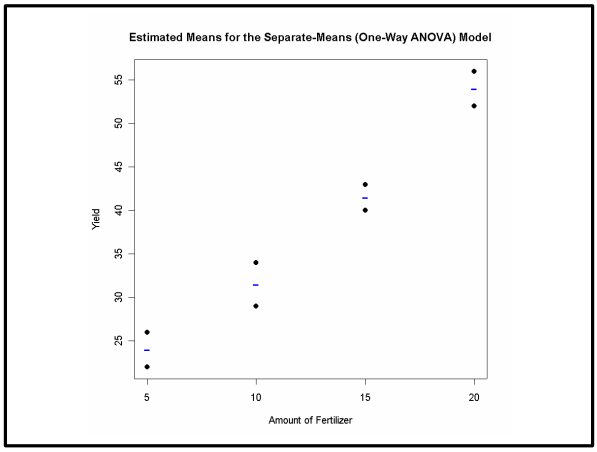
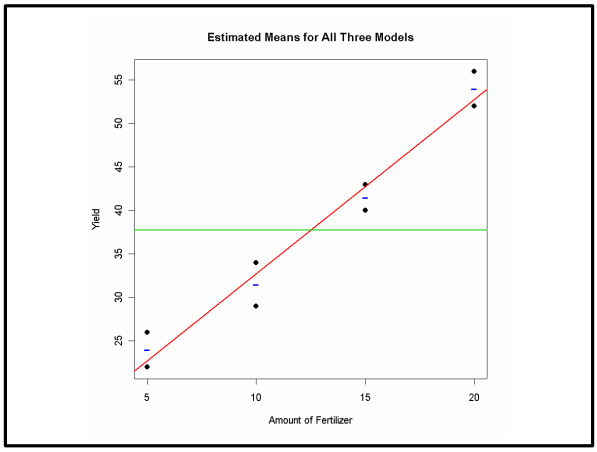
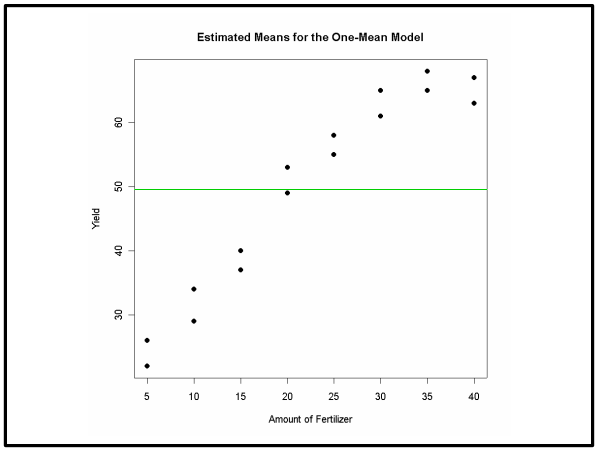
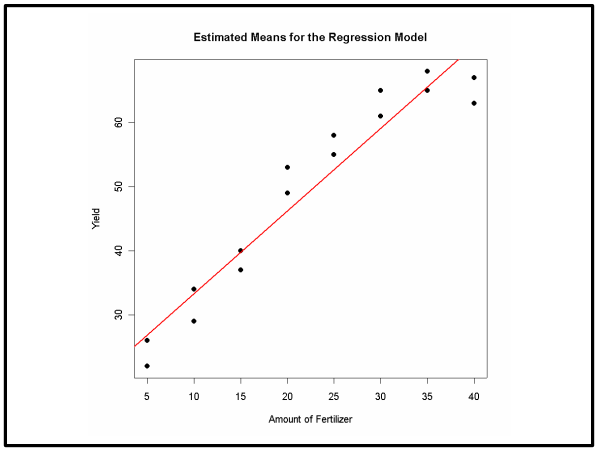

Estimated Means for the One-Mean Model
Yield
Amount of Fertilizer
5
10
15
20
25
30
35
40
45
50
55

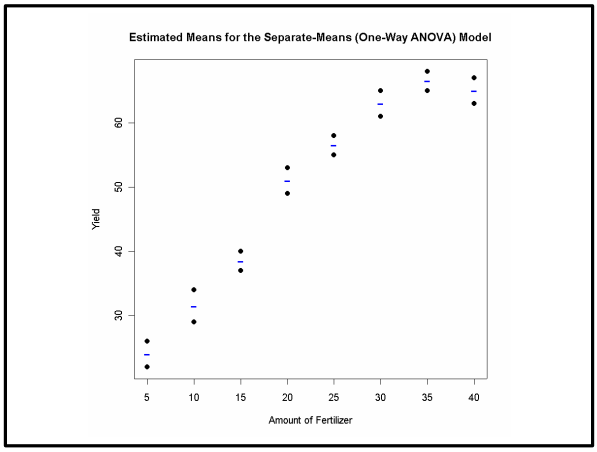

Estimated Means for the Regression Model
Yield
Amount of Fertilizer
5
10
15
20
25
30
35
40
45
50
55

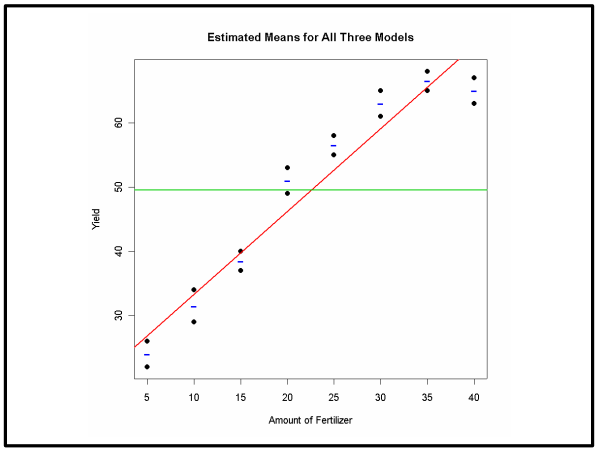

Estimated Means for the Separate-Means (One-Way ANOVA) Model
Yield
Amount of Fertilizer
5
10
15
20
25
30
35
40
45
50
55


Estimated Means for All Three Models
Yield
Amount of Fertilizer
5
10
15
20
25
30
35
40
45
50
55


Estimated Means for the One-Mean Model
Yield
Amount of Fertilizer
30
40
50
60
5
10
15
20
25
30
35
40


Estimated Means for the Regression Model
Yield
Amount of Fertilizer
30
40
50
60
5
10
15
20
25
30
35
40


Estimated Means for the Separate-Means (One-Way ANOVA) Model
Yield
Amount of Fertilizer
30
40
50
60
5
10
15
20
25
30
35
40


Estimated Means for All Three Models
Yield
Amount of Fertilizer
30
40
50
60
5
10
15
20
25
30
35
40

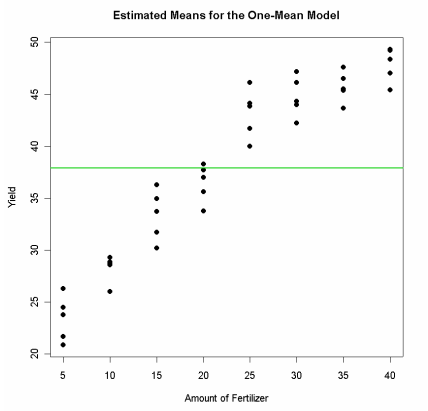
H_0: The mean of Y is the same for all X.

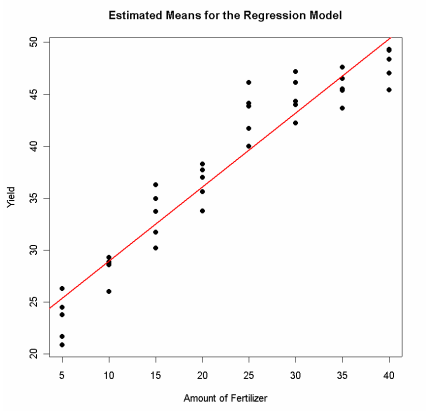
H_1: The mean of Y is related to X through a straight-line equation with non-zero slope.

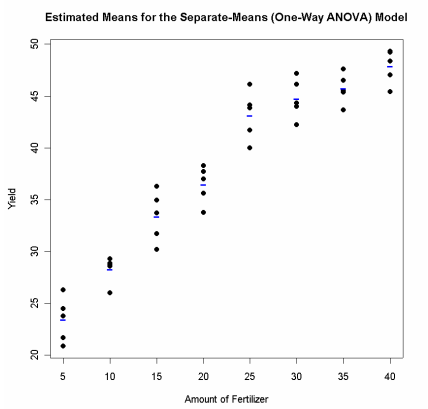
H_2: The mean of Y is different for each value of X.

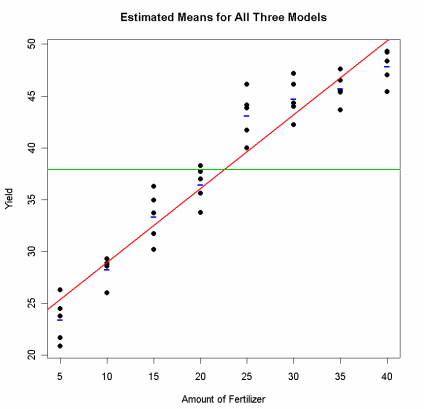
Null	Alternative	Test
H_0	H_1	Regression test of slope equal to 0
H_0	H_2	One-way ANOVA test of all means equal
H_1	H_2	Lack-of-fit test for simple linear regression (Null says linear regression OK. Alternative says not OK.)

Null	Alternative	Test Statistic	D.F.
H_0	H_1	$\frac{[RSS_0-RSS_1]/[(n-1)-(n-2)]}{RSS_1/(n-2)}$	1, n-2
H_0	H_2	$\frac{[RSS_0-RSS_2]/[(n-1)-(n-I)]}{RSS_2/(n-I)}$	I-1, n-I
H_1	H_2	$\frac{[RSS_1-RSS_2]/[(n-2)-(n-I)]}{RSS_2/(n-I)}$	I-2, n-I







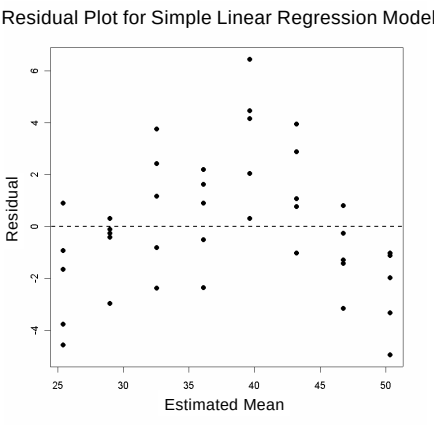


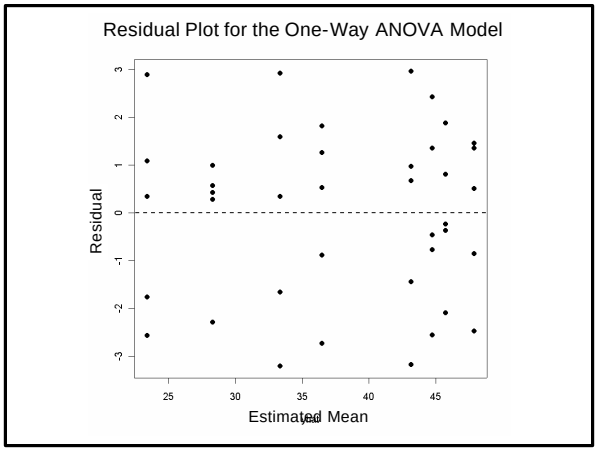
RSS_0=2917 RSS_1=256 RSS_2=121

Null	Alt.	Test Statistic	D.F.	*p*-value
H_0	H_1	$\frac{[2917-256]/[(40-1)-(40-2)]}{256/(40-2)}=395$	1, 40-2	<0.001
H_0	H_2	$\frac{[2917-121]/[(40-1)-(40-8)]}{121/(40-8)}=106$	8-1, 40-8	<0.001
H_1	H_2	$\frac{[256-121]/[(40-2)-(40-8)]}{121/(40-8)}=6$	8-2, 40-8	<0.001

We have convincing evidence that:

1. If we assume that the mean of Y follows a straight-line relationship with X, the slope of the simple linear regression line is not zero.
2. The mean of Y is not the same for all values of X.
3. The mean of Y does NOT seem to be related to X through a straight-line equation.




Residual Plot for the One-Way ANOVA Model
Residual
Estimated Mean
3
2
1
0
-1
-2
-3
25
30
35
40
45