### Linear Regression Part 2

<table>
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<tr>
<th>Blk</th>
<th>Trt</th>
<th>Trt^2</th>
<th>Grain Yield</th>
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### Linear Regression with Org. Obs.

Regression Output:
- **Constant**: 2.1247
- **Std Err of Y Est**: 1.4467
- **R Squared**: 0.8863
- **No. of Observations**: 15
- **Degrees of Freedom**: 13

- **X Coefficient(s)**: 0.0532
- **Std Err of Coef.**: 0.0053

$$Y = 2.1247 + 0.05317 X$$

### Quadratic Regression with Orig. Obs.

Regression Output:
- **Constant**: 0.7599
- **Std Err of Y Est**: 0.7985
- **R Squared**: 0.9680
- **No. of Observations**: 15
- **Degrees of Freedom**: 12

- **X Coefficient(s)**: 0.1078, -0.0003
- **Std Err of Coef.**: 0.0103, 4.93E-05

$$Y = 0.7599 + 0.10776 X - 0.00027 X^2$$
Grain Yield Response to N Application

Grain Yield (Mg/ha) vs. Applied N (kg/ha)

- Blk 1
- Blk 2
- Blk 3
- Pred.Yld.Lin.

Grain Yield Response to N Application

Grain Yield (Mg/ha) vs. Applied N (kg/ha)

- Obs.Yld.
- Pred.Yld.Lin.
- Pred.Yld.Quad.
Regression using Treatment Totals

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<thead>
<tr>
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Linear Regression with Treatment Totals

Regression Output:
- **Constant**: 6.374
- **Std Err of Y Est**: 4.4463
- **R Squared**: 0.9147
- **No. of Observations**: 5
- **Degrees of Freedom**: 3

X Coefficient(s) **0.1595**
Std Err of Coef. **0.0281**

\[ Y = 6.374 + 0.15952 X \]

Quadratic Regression with Treatment Totals

Regression Output:
- **Constant**: 2.2797
- **Std Err of Y Est**: 0.5650
- **R Squared**: 0.9991
- **No. of Observations**: 5
- **Degrees of Freedom**: 2

X Coefficient(s) **0.3233** **-0.0008**
Std Err of Coef. **0.0126** **6.04E-05**

\[ Y = 2.27971 + 0.32329 X - 0.00082 X^2 \]
Example Problem: Maize grain yield response to nitrogen applications.

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<tr>
<th>Trt</th>
<th>I</th>
<th>II</th>
<th>III</th>
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ANOVA

Total SS = 239.2634
Blk SS = 1.6532
Trt SS = 231.8251
Error SS = 5.7852

SS reg = r^2 * Trt SS = 205.4628
SS Dev from Reg = (1-r^2) * Trt SS = 26.3623
Total (Trt SS) = 231.8251

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<th>MS</th>
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