FINDING THE UNCERTAINTY IN THE SLOPE OF A LINE
Excel’s LINEST Function

Frequently we find a physical quantity as the slope of a graph. However, we don’t have any way to evaluate the uncertainty in the slope we obtained. Fortunately, Excel has a worksheet function LINEST which extends the results of the TRENDLINE function to give the uncertainty in the slope. The syntax of this function is: LINEST(known_Y_values, known_X_values, Constant, Statistics).

If Constant is TRUE, LINEST calculates the intercept. Otherwise, the intercept is set to y = 0.

If Statistics is TRUE, LINEST returns regression statistics.

LINEST returns several values and thus is an example of an array function. To use an array function we must:
1. Select an output range,
2. Press CTRL+SHIFT+ENTER to complete the entry.

LINEST returns an array that is two columns wide and three rows long with values as follows:

<table>
<thead>
<tr>
<th>Slope</th>
<th>Intercept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard error of the slope</td>
<td>Standard error of the intercept</td>
</tr>
<tr>
<td>R2</td>
<td>Standard error in y</td>
</tr>
</tbody>
</table>

The spreadsheet below shows a set of data. We will show you how to use LINEST to find the uncertainty in the calculated slope.

```
1. Open a new Excel worksheet. Enter the text in A1:B5.
2. Select B8:C10, type the formula =LINEST(B2:B5,A2:A5,TRUE,TRUE) and press CTRL+SHIFT+ENTER to complete the entry.
3. Notice that the slope is determined to be 2.0 ± 0.2.
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