



*Tutorials and worked examples for simulation,
curve fitting, statistical analysis, and plotting.*
<http://www.simfit.org.uk>

When an experimental data set is approximately linear it is possible to fit a straight line and use this as a standard curve for calibration, that is, predicting x with 95% confidence limits given y .

From the main SIMFIT menu choose [A/Z], open program **linfit**, then select simple calibration using a straight line and view `line.tf1`, the test file provided, containing the following data.

x	x	se
1.0000	4.4644	1.7613
1.0000	3.1709	1.7613
1.0000	3.7496	1.7613
1.0000	4.2803	1.7613
2.0000	3.2552	1.6302
2.0000	2.6066	1.6302
2.0000	1.3453	1.6302
2.0000	4.0994	1.6302
3.0000	4.1542	1.0229
3.0000	3.9500	1.0229
3.0000	4.5843	1.0229
3.0000	2.2531	1.0229
4.0000	2.7339	0.88866
4.0000	3.7064	0.88866
4.0000	4.8613	0.88866
4.0000	4.1335	0.88866
5.0000	6.2512	0.83435
5.0000	5.8701	0.83435
5.0000	7.6285	0.83435
5.0000	5.8742	0.83435
6.0000	4.7595	0.43208
6.0000	5.0619	0.43208
6.0000	5.5940	0.43208
6.0000	4.6181	0.43208
7.0000	5.2595	1.2461
7.0000	7.8164	1.2461
7.0000	5.9849	1.2461
7.0000	5.0962	1.2461
8.0000	5.1014	2.4624
8.0000	10.259	2.4624
8.0000	6.8319	2.4624
8.0000	9.8217	2.4624
9.0000	10.568	1.2809
9.0000	9.9537	1.2809
9.0000	7.6227	1.2809
9.0000	9.0264	1.2809
10.000	13.560	1.5105
10.000	10.573	1.5105
10.000	10.966	1.5105
10.000	10.249	1.5105

The columns contain data in the following format.

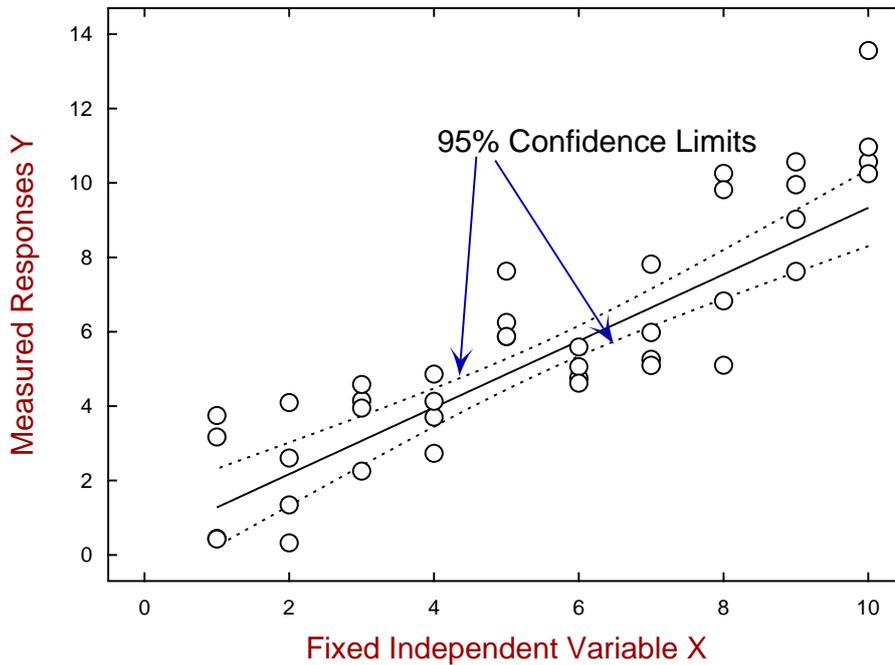
1. **Column 1:** the independent variable x .
2. **Column 2:** the response y presumed to be linearly dependent on the value in column 1.
3. **Column 3:** the positive sample standard deviation of the replicate response measurements.
This column can be omitted or set to 1 if unweighted regression is required.

Here are the parameter estimates for the best-fit straight line followed by a graph with confidence limits, which are the branches of a hyperbola for the true values of y at the corresponding fixed values of x .

Parameter	Value	Standard error	Lower95%cl	Upper95%cl	p
Intercept	0.38322	0.61376	-0.85926	1.6257	0.5361 *
Slope	0.89513	0.10508	0.68241	1.1078	0.0000

$R^2 = 0.7862, R = 0.8867, p = 0.0000$

The Standard Curve $y = 0.8951x + 0.3832$



The following table gives the prediction of x with 95% confidence limits given y , which are confidence limits for the true value of x given the corresponding true, i.e. fixed exact, values of y . Note that, if a prediction leads to a confidence limit outside of the range of x values, a warning message is displayed, e.g., for the case $y = 2$ and $y = 9$.

y -measured	x -predicted	Lower95%cl	Upper95%cl	
2.0	1.8062	5.3878	2.6274	<i>Limit out of range</i>
3.0	2.9234	1.9662	3.5681	
4.0	4.0405	3.3589	4.5434	
5.0	5.1577	4.6680	5.6024	
6.0	6.2748	5.8250	6.8134	
7.0	7.3920	6.8487	8.1578	
8.0	8.5091	7.8092	9.5653	
9.0	9.6263	8.7435	10.999	<i>Limit out of range</i>