## winfit

Welcome to WINFIT 1.0. This program is not free it is shareware.

## What is WINFIT

A general purpose Non Linear Weighted Least Squares Fitting program for windows 3.x

## Features

* Reads a simple ASCII file, space or tab delimited of X Y with an optional Y-error data.
* The data can be plotted with log axis options.
* The program uses Levenberg-Marquardt fitting method.
* There are some built in functions and the a user-defined function.
* The program can generate weights that improve fitting performance for some problems.
* This version can read up to 500 data points and fit up to 10 parameters.
* The program provides a REPORT file and the plot can be copied to the clipboard.
* The program will calculate and display the COVARIANCE and CURVATURE matrixes

## Using WINFIT

In order to use a non linear fitting algorithm the user must start the fitting session with an initial guess for the parameters to be fitted. If this guess is good enough the program will converge to a "good" fit.

1. Prepare your data file (with NOTEPAD for example) and save it with .DAT extension Open the file with the FILE OPEN menu command. A sample data file FIT.DAT is provided with the program.

2. If your file is not simple (column 1 is X and Column 2 is Y) specify the columns in the FILE OPEN window also specify the Y-error column. The Y-error should represent one standard deviation in the value of Y.

3. As an indication that the file was read correctly you should check the No. of Points in the WINFIT window, it will show the number of data points in your file.

4 You are ready to view your data so you can click the PLOT button. You can also view the numbers with the DATA VIEW menu.

5. Next select an equation from the WINFIT window, if you are in the PLOT window click the FIT window to go back. As you Select an equations the Parameters windows will appear ( a simple linear function is provided as a test to be used with the file FIT.DAT).

6. Change the initial Parameters and click the PLOT button. Repeat that process until you see you data with the fitted curve. This should provide a good initial guess for the program to start fitting.

7. From the WINFIT window click the FIT button.

## The Results

The results of the fits will appear in the parameter window with the standard deviation in each parameter. During the fitting process the message window will give information about the fitting process. An iteration starting with a + (pluse) sign is a successful iteration (the chi-square was minimized).
The program will iterate until the number of iterations is equal to the number in the Max iteration box (you can change this number) or the %-Error is equal or less then value in the Chisq % Error box (you can change this value).
The COVARIANCE and CURVATURE Matrixes can be viewed by choosing this option in the PARAMETERS menu.

## Method and Math

1. The chi-square is calculated as
chisq=sum((Y(xi)-Yi)/sigYi)**2)  for i=1 to N
where N is the number of data points
Y(xi) is the fitted curve value at xi
Yi is the Y value for data point i
sigYi is the standard deviation in Yi

2. The reduced chisq is defined by
rchisq=chisq/(N-Nfit) where Nfit is the number of fitted parameters. (parameters that are kept variable during the fit).

3. The Percent Error in chi-square is Defined:
%Error=100(1-chisq/ochisq) where ochisq is the value of chi-square in the previous iteration.

4. In Some problems a better fit is obtained if the data is weighted. A simple way for generate the weights (if they are not available in the data file) is to use the DATA menu and choose SET WEIGHTS this will set the value of sigYi (see note 1).

## Guarantee

None, the author is not responsible to any damage that may be caused by the program or by the use of the program results. The responsibility is of the user alone.

## Menus

File
Parameters
Data
Help

## File

**Open Data**
This menu will prompt you for the ascii file name where the X,Y data is stored. The file should be organized in 2 or 3 columns of X,Y or X,Y and the error in Y. The numbers could be tab or space delimited. If the file contains more than 3 columns,by default WINFIT will read only the first 2 , however you can specify the which columns to read in the file open form.

**Save Report As**
Save a report of the fit parameters in a text file.

**Exit**
Exits WINFIT

## Parameters

**Show**
Displays the fit parameters form, you must select an equation first.

**View Covariance Matrix**
Displays the covariance matrix obtained form the fit. The elements on the diagonal are the variances in each fitted parameter.

**View Curvature Matrix**
Displays the Curvature Matrix.

## Data

### Set Weights

Allows to set the weights as a simple power function of the Y values; W=A*Y**B
This can help in some fitting problems to force the fit to a specific region of the unweighted data.

### View

Displays the X,Y, Error in Y and the Y(x) which is the fitted Y value.

## Help

**Help**
Help for using WINFIT

**About**
Details on WINFIT

## Registration

If you use WINFIT for more than 30 days (or you liked it much sooner) you should register it by sending $15 to:

Yaron Danon
14 Beman Lane
Troy, NY 12180

A registered user will receive the updates of the next versions as they become available.

## Suggestions

Suggestions and comments are welcomed and can be E-Maile to:

Danony@rpi.edu

## DIGITIZE

Also available is DIGITIZE, a windows program to digitize scanned plots. DIGITIZE can do the reverse job of a plotting program; given a plot it generates a set of X,Y points.