User's Guide

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Installation

Before installing *Linear Algebra Solved!*, take a moment to review the system requirements. It is always a good idea to make sure all other applications are closed while installing new software.

System Requirements

To use *Linear Algebra Solved!*, your computer must have one of the following Windows operating systems:

- Windows 2000
- Windows 2003
- Windows XP
- Windows Vista

Installation of *Linear Algebra Solved!* is not supported on Windows 95/NT 4.x, Macintosh, or Linux computers.

Install Linear Algebra Solved!

You can install *Linear Algebra Solved!* from the CD or from the file that you downloaded.

To install *Linear Algebra Solved!*

1. Do one of the following:
   - If you are installing from a CD, insert the CD into the CD-ROM drive.
   - If you downloaded your copy of *Linear Algebra Solved!*, double-click the file that you downloaded.

2. In the *Linear Algebra Solved! Setup Wizard* window, click **Next** to begin the installation.

3. Read the License Agreement, select **I Agree** and click **Next**. If you decline, you cannot continue with the installation.

4. Select a folder into which you want to install *Linear Algebra Solved!* and click **Next**.

5. All steps have now been completed, click **Next** to confirm installation. The progress bar tracks the progress of the installation.

Sometimes a computer's CD-ROM drive does not automatically run a CD.

To start the installation from the CD

1. On your desktop, double-click **My Computer**.
2. In the My Computer window, double-click the icon for your CD-ROM drive.
3. In the list of files, double-click **Setup.exe**.

Start Linear Algebra Solved!

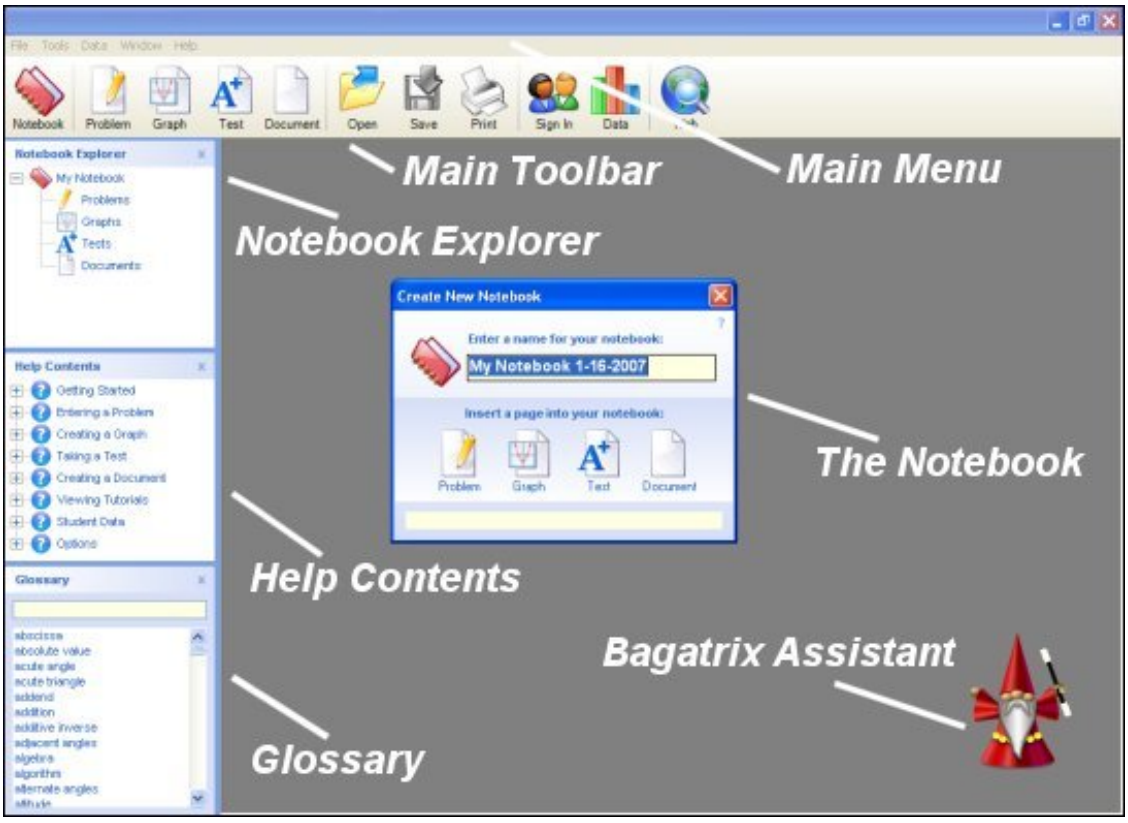
Once installed successfully, you can start *Linear Algebra Solved!* by double-clicking the *Linear Algebra Solved!* icon on your desktop, or by clicking **Start** → **All Programs** → **Bagatrix** → **Linear Algebra Solved!**.

Getting Started

This section contains information about starting *Linear Algebra Solved!* and the features that are available in the main window.

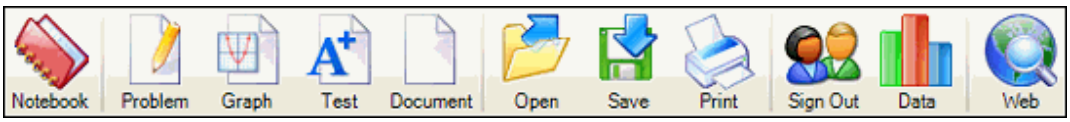
Overview

Many *Linear Algebra Solved!* features can be accessed from the main window. This is an overview of the basic setup:



Main Toolbar

The primary functions of *Linear Algebra Solved!* can be found on the Main Toolbar:



Notebook – Creates a new Notebook, which will hold all of your problems, graphs, tests, documents, and tutorials. When a Notebook is saved, all items in the notebook are saved.

Problem – Enter in your own problems, or view example problems. The problems are then solved with step-by-step explanations.

Graph – Create graphs of your problems.

Test – Create printable tests, and also interactive multiple choice tests.

Document – Create a document using math symbols. You can copy and paste your problems and tests directly into the document.

Open – Open your saved Notebooks.

Save – Save the current Notebook, containing all your problems, graphs, tests, documents, and tutorials. Settings are also saved in the Notebook.

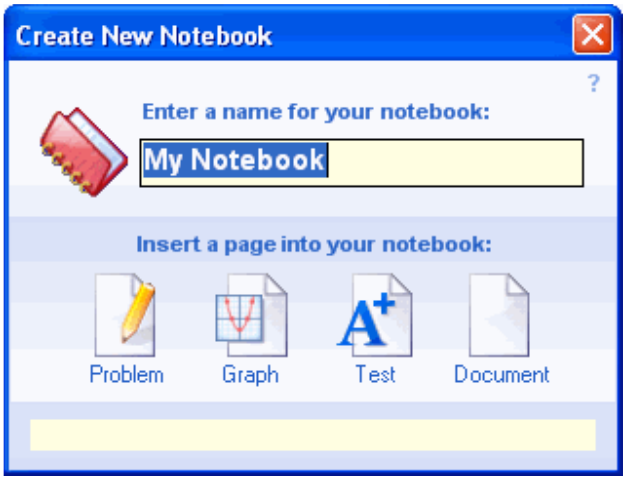
Print – Prints the content of the current window.

Sign In – Multiple choice test data is saved when a student is signed in.

Data – View test data of the student that is currently signed in.

Web – Visit the Bagatrix website.

Notebook

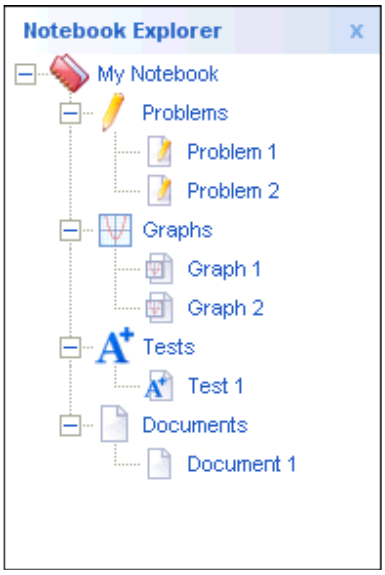


When you open a new problem, graph, test, or document, you create a new "notebook" to store everything in. You can store as many of each items as you want in a notebook, and save the contents of the entire notebook by clicking on the *Save* icon on the *Main Toolbar*.

Bagatrix Assistant

The *Bagatrix Assistant* provides dynamic help topics, tutorials, and tips on the tasks you perform. For example, the Assistant can explain why the input is invalid while entering a problem, and explain what is needed to make it correct. The Assistant also provides explanations on every step while solving problems, and links glossary terms used in the explanations. You can hide/show the wizard by going to the menu and selecting **Tools → Bagatrix Assistant**.

Notebook Explorer



The *Notebook Explorer* lets you navigate through the problems, graphs, tests, and documents you currently have open. You can rename the objects in your Notebook by clicking and highlighting them in the Notebook Explorer, then clicking on them again. All items in the Notebook Explorer are saved when you

save a Notebook. You can hide/show the Notebook Explorer by going to the menu and selecting **Tools** → **Notebook Explorer**.

Help Contents

The *Help Contents* panel provides categorized help topics and can be displayed on the left-hand side of the screen. You can hide/show the Help Contents by going to the menu and selecting **Help** → **Contents**.

Glossary

The *Glossary* panel provides an alphabetized list of hundreds of mathematical terms, and can be displayed on the left-hand side of the screen with the *Notebook Explorer* and *Help Topics*. You can select a term by double-clicking a word in the list, or typing it in by hand and pressing enter. You can hide/show the Glossary by going to the menu and selecting **Tools** → **Glossary**.

Calculator

The *Calculator* can be displayed by going to the menu and selecting **Tools** → **Calculator**. The Bagatrix Calculator only enables keys that can currently be pressed, and displays the entire expression in the Calculator display window. To copy the expression, right-click on the Calculator display window and select **Copy**.

Entering a Problem

Linear Algebra Solved! allows you to enter in your own problems, and provides step-by-step solutions. To begin, click on the **Problem** icon on the *Main Toolbar*, or go to the menu and select **File** → **New** → **Problem**.

Problem Toolbar

Answer – Generates the step-by-step answer to the problem entered on the screen, using the method displayed in the *Automatic Topic Selector*.

Example – Enters an example problem onto the paper. After clicking Example, a topic must be selected from the *Select a Subject* screen. You can select the difficulty of the example problem on this screen as well. The default difficulty can be set on the *Options* screen by right-clicking on the paper and selecting **Options** → **All Options**.

Graph – When this icon is enabled, you can graph the solution to the problem.

Step – Displays the next step in the problem solving process. If the option *Show Step-by-Step* is selected, the *Step* button will move one step at a time. If not, the entire problem will be displayed when the *Step* button is clicked.

Note: When there are multiple papers on the screen, you can slide the pages by clicking and dragging them with the mouse. You can quickly arrange the papers by right-clicking on a page and selecting ***Arrange papers****. You can also save a page as an image by right-clicking on a page and selecting* ***Export Page Image****.*

Insert – Launches *Quick Insert*, a tool to insert various mathematical symbols and expressions into the problem.

Erase – Erases the problem and steps from the paper. If *Leave original problem* is checked, only the steps are erased and the original problem is left on the screen.

Automatic Topic Selector

When entering a problem, the topics that can be used to solve your problem are automatically displayed in the dropdown list. You can click on the *Topic Selector* to select from the list of available topics.

Using the Keyboard

The following keys can be used to enter in your problems:

Numbers:	**0-9**
Letters (variables):	**a-z**
Operators:	**+ (add) – (subtract) * (multiply) / (divide)**
Decimal Point:	**.**
Parenthesis:	**( )**
Brackets:	**[ ]**
Absolute Value:	**| |**
Exponent:	**^**
Square Root:	**~**
Equal Sign:	**=**
Inequality Signs:	**> (greater than) < (less than)**
	>= (greater than or equal to) <= (less than or equal to)

Some Input Notes

- To group multiple terms (such as in the numerator and/or denominator of a fraction), use parenthesis. For example, **(x+2)/3** will keep **x+2** in the numerator, and **~(x+2)** will keep **x+2** under the square root symbol.
- Outside parenthesis used to group multiple terms are not displayed on the screen. For example, while you will need to input **(x+2)/3** to keep **x+2** in the numerator, it will display on the screen without the outside **( )** since they are not needed in the problem, and have no effect on the calculations.
- Exponents can be entered without using **^**. Entering **5x2** is the same as entering **5x^2**.
- To enter in a variable following a fraction that you do not want in the denominator, use the multiplication symbol. For example: **1/2*x**. Entering **1/2x** will place the **x** in the denominator.
- To enter in problems such as *Systems of Equations* and *Evaluating Variables*, multiple lines of input are needed. To insert a new line, click on **Quick Insert** followed by **New Line**, or use the shortcut key: _.

  For example, to enter in a *System of Equations*, you can type:

  x+y=14 **<Quick Insert → New Line>** **2x+3y=35**
  or
  x+y=14_2x+3y=35

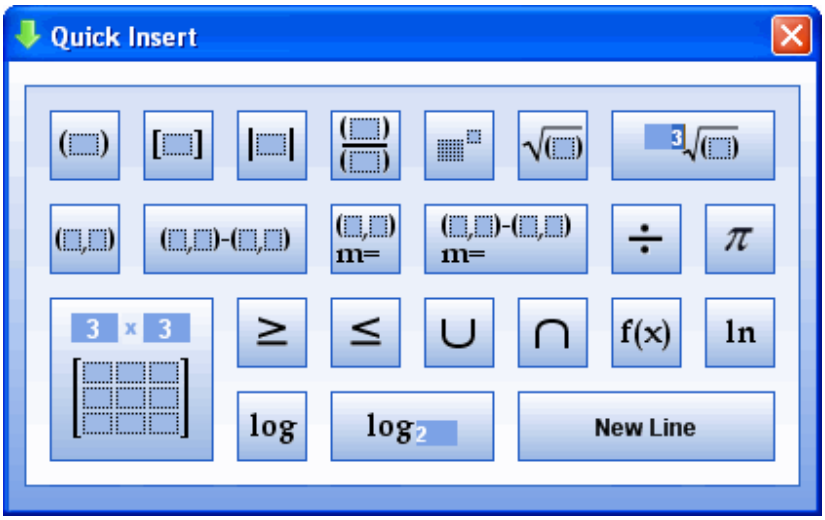
For an *Evaluating* problem, you can enter:

x+y+z <Quick Insert → New Line> **x=2** <Quick Insert → New Line> **y=3** <Quick Insert → New Line> **z=4**
or
x+y+z_x=2_y=3_z=4

For a *Point Slope* problem, you can enter:

(2,3) <Quick Insert → New Line> **m=2**
or
(2,3)_m=2

Quick Insert



Quick Insert provides a method to quickly insert common math symbols and expressions into your problem. Symbols and expressions include:

Square Root, Nth Root, Fractions, Parenthesis, Brackets, Absolute Values, Exponents, Less Than or Equal To, Greater Than or Equal To, Pi, Division Symbol, and New Line.

New Line

The *New Line* button inserts a new line under the cursor on the paper. Additional lines are needed when multiple items must be entered. *Systems of equations*, *evaluating*, and *point-slope* problems are examples of problems requiring multiple lines of input.

Note: Where parentheses are shown on the Quick Insert buttons, parentheses are entered into the problem. Parentheses used solely for grouping multiple terms in fractions, roots, etc., are not displayed on the screen during the solving process.

Creating a Graph

Linear Algebra Solved! allows you to create detailed graphs of your problems. You can display an unlimited amount of graphs on the screen simultaneously. To begin, click on the **Graph** icon on the *Main Toolbar*, or go to the menu and select **File** → **New** → **Graph**.

Graph Toolbar

Refresh – Redraws the graph window using all the current settings.

Zoom In – Moves closer to the graph by shrinking the x and y axis ranges.

Zoom Out – Moves away from the graph by increasing the x and y axis ranges.

Note: a specific region of the graph can be selected by clicking the graph window and dragging the mouse.

Reset – Sets the x and y axis range back to the default value.

Insert – Launches *Quick Insert*, a tool to insert various mathematical symbols and expressions into the problem.

Erase – Clears all objects from the graph.

The Graph Cell

To graph a problem, enter the problem into one of the graph cells. There are ten graph cells available by default, but additional cells can be added by clicking on the triangle at the bottom of the last cell. The color of the graph can be changed by clicking on the colored rectangle in the upper-right corner of the graph cell and selecting a new color. There are also numerous options available by right-clicking the graph cell with the mouse (including inserting various functions, calculating areas, and setting specific properties for each graph).

Using the Keyboard

Some of the problem types that can be graphed are:

Points:	**(1,2)**
Segments:	**(1,2)-(3,4)**
Functions:	**f(x)=x2**
Equations:	**y=x2+3**
Inequalities:	**y>3x+2**
Conics:	**y2+x2=9**

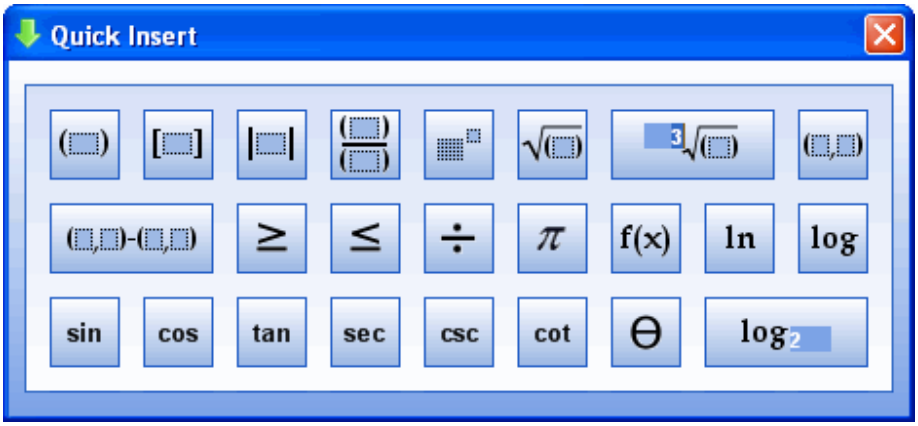
The following keys can be used to create graphs:

Numbers:	**0-9**
Letters (variables):	**x, y**
Operators:	**+ (add) – (subtract) * (multiply) / (divide)**
Decimal Point:	**.**
Parenthesis:	**( )**
Brackets:	**[ ]**
Absolute Value:	**| |**
Exponent:	**^**
Square Root:	**~**
Equal Sign:	**=**
Inequality Signs:	**> (greater than) < (less than)**
	>= (greater than or equal to) <= (less than or equal to)
Other Functions:	**sin, cos, tan, sec, csc, cot, log, and ln (natural log)**

Some Input Notes

- To group multiple terms (such as in the numerator and/or denominator of a fraction), use parenthesis. For example, **(x+2)/3** will keep **x+2** in the numerator, and **~(x+2)** will keep **x+2** under the square root symbol.
- Outside parenthesis used to group multiple terms are not displayed on the screen. For example, while you will need to input **(x+2)/3** to keep **x+2** in the numerator, it will display on the screen without the outside **( )** since they are not needed in the problem, and have no effect on the calculations.
- Exponents can be entered without using **^**. Entering **5x2** is the same as entering **5x^2**.
- To enter in a variable following a fraction that you do not want in the denominator, use the multiplication symbol. For example: **1/2*x**. Entering **1/2x** will place the **x** in the denominator.

Quick Insert



Quick Insert provides a method to quickly insert common math symbols and expressions into your problem. Symbols and expressions include:

Square Root, Nth Root, Fractions, Parenthesis, Brackets, Absolute Values, Exponents, Points, Segments, Less Than or Equal To, Greater Than or Equal To, Pi, and Division Symbol.

Note: Where parentheses are shown on the Quick Insert buttons, parentheses are entered into the problem. Parentheses used solely for grouping multiple terms in fractions, roots, etc., are not displayed on the screen during the solving process.

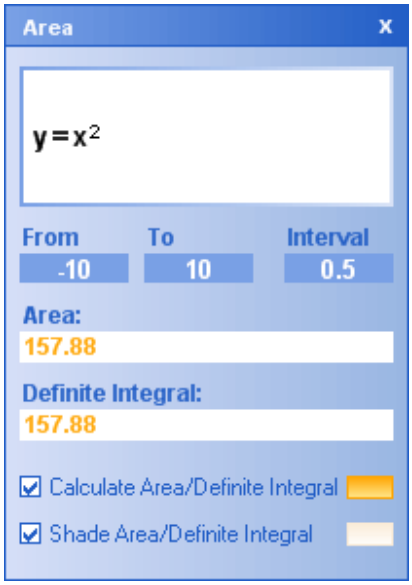
Graph Features

The graph also includes additional features:

- **Calculating Area**

  You can calculate the area of equations and functions by right-clicking on the graph cell the problem is located and selecting **Options** → **Area**. The *Area* screen lets you calculate the area and definite integral of the problem, and also lets you shade the region using the color of your choice. The integer area range can be set using the *From* and *To* fields. The interval can also be set using the *Interval* field. The smaller the interval, the more accurate the calculation will be (*the interval must be larger than 0 to calculate an area*).

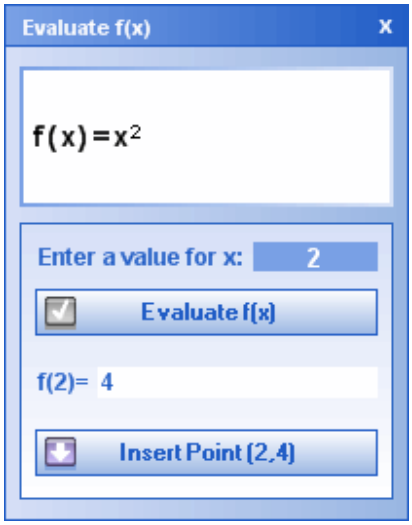
  The Area Screen:



- **Evaluating f(x)**

  You can evaluate functions by right-clicking on the graph cell the function is located and selecting **Options** → **Evaluate f(x)**. The *Evaluate f(x)* screen lets you enter in a value for *x* to be substituted into the function. After you enter in a value for *x* and click the *Evaluate f(x)* button, you can click on the *Insert Point* button to insert the point into the current graph.

  The Evaluate f(x) Screen:



- **Exporting Graph Images**

  You can export the current graph image by right-clicking on the graph window and selecting **Export Graph Image**. You have the option of

exporting the file as a **.bmp*, **.gif*, **.jpeg*, **.png*, or **.tif* file. Once the graph image is exported and saved to your computer, you can import the image into most word processing programs. You can also right-click on the graph window and select **Copy Graph to Clipboard**. You can then open a word processing program and select **Edit → Paste** to place the image directly into your document without saving the file.

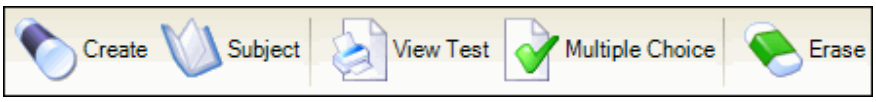
- **Printing Blank Graph Paper**

  To practice creating your own graphs by hand, you can print blank graph paper by right-clicking on the graph window and selecting **Print Blank Graph Paper**.

Taking a Test

Linear Algebra Solved! allows you to create randomly generated standard and multiple choice tests. To begin, click on the **Test** icon on the *Main Toolbar*, or go to the menu and select **File** → **New** → **Test**.

Test Toolbar



Create – Creates a test based on the selected subjects, number of problems, and difficulties selected.

Subject – Displays the *Select a Subject* screen, which allows you to select a subject to be added to the test. The difficulty level of the subject can also be selected on the *Select a Subject* screen. The default difficulty can be set on the *Options* screen by right-clicking the paper and selecting **Options**.

View Test – After a subject has been selected, and the *Create* button has been clicked, you can view the test. This option creates a randomly generated test that can be printed. The option to generate an answer sheet is also available.

Multiple Choice – After a subject has been selected, and the *Create* button has been clicked, you can create a multiple choice test. This option creates a randomly generated test, and allows you to answer the questions by selecting one of the multiple choice answers. Your test is then graded upon completion. The multiple choice test can also be printed, including an optional answer sheet.

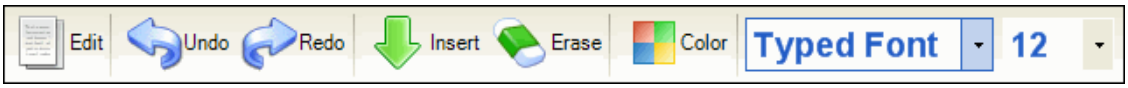
Erase – Clears the entire contents of the test.

*Note: you can right-click on a created test and select **Export to Document** to export the created test into a Math Document.*

Creating a Document

Linear Algebra Solved! allows you to create documents using math notation and symbols found within the program. You can use this feature to create custom assignments, quizzes, tests, handouts, and more. To begin, click on the **Document** icon on the *Main Toolbar*, or go to the menu and select **File** → **New** → **Document**.

Document Toolbar



Edit – Displays/hides the document *Edit Window*.

Undo – Undoes the last edit made to the document.

Redo – Redoes the last *undo* made to the document.

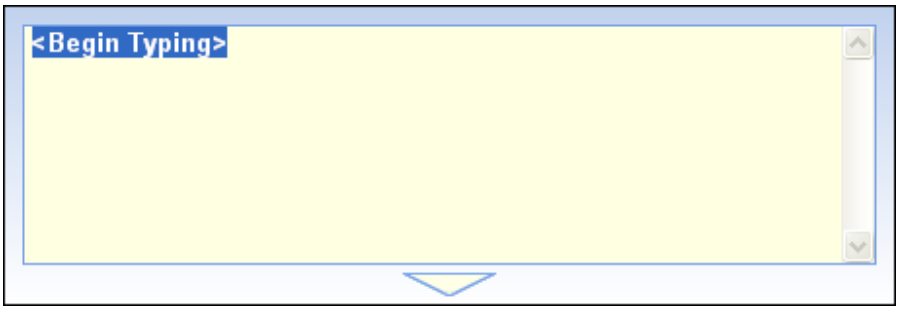
Insert – Launches *Quick Insert*, a tool to insert various mathematical symbols and expressions into the problem.

Erase – Clears the contents from the *Edit Window*.

Color – Sets the text color of the document.

The font style and size can be set using the last two dropdown lists. *Typed Font* is the default style, with *Handwritten Font* as an alternate style. The default size of the font is *12*, with options ranging from *8* to *16*.

Editing a Document



The document can be edited by typing in the textbox, and converted into math notation by clicking on the yellow arrow underneath the textbox. Some conversions occur automatically while entering text. For example, 1/2 is automatically converted into fraction notation with the 1 over the 2 separated by a division line.

Document Tips

- Problems can be copied and pasted into the document. After entering a problem in the *Problem* section, right-click on the paper and select **Copy** (you can select just the problem, answer, or all). You can then move back to the open document, right-click on the *Edit Window* and select **Paste** to insert the problem.
- Tests can be exported into the document. After creating a test in the *Test* section, click on the *View Test* or *Multiple Choice* button. Next, right-click on the test and select **Export to Document**. With the base test copied into the document, custom modifications can be made to suit your particular needs.

Inserting Special Keys

You can insert several special keys and text decorations by right-clicking on *Edit Window* and selecting **Insert**. If text is highlighted while applying the insert, the highlighted text will be included (when applicable). For example, if the text **2+3** is highlighted and you select **Insert** → **Square Root**, **2+3** will be replaced by **Root[2+3]**.

Student Data

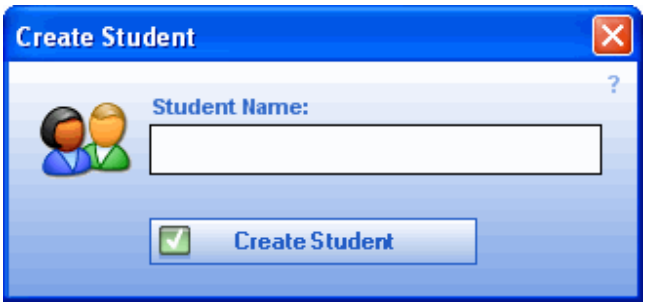
Linear Algebra Solved! allows you to save test data and chart progress. To view student data, click on the **Data** icon on the *Main Toolbar*, or go to the menu and select **Data** → **View**. You must be signed in to view student data.

Student Management

In order to save and view test data, you must first create a student. If you have already created a student, you can sign in and continue.

Creating a Student

To create a student, go to the menu and select **Data** → **Create Student**.



You can create a unique student name up to 50 characters long. After entering the name, click the *Create Student* button.

Deleting a Student

To delete a student, go to the menu and select **Data** → **Delete Student**. You can then select the student you would like to delete from the dropdown list.

Signing In

To sign in under one of the previously created students, click the **Sign In** button on the *Main Toolbar*, or go to the menu and select **Data** → **Sign In**. If someone is currently signed in, the *Sign In* button on the toolbar will be switched to a *Sign Out* button.

Once signed in, your student name will appear in the upper-right corner of the screen next to a green light:

Signing Out

To sign out, go to the menu and select **Data** → **Sign Out**.

Creating Data

Once you are signed in, you can begin creating student data. To create data, click on the **Test** icon on the *Main Toolbar*, or go to the menu and select **New** → **Test**. Next, select a subject by clicking the *Subject* button then create the test by clicking the *Create* button (*only one subject is allowed per test when signed-in*). After the test is created, click the *Multiple Choice* button. When you are signed in, all multiple choice test scores are saved under your student name.

Note: The multiple choice test has an orange header when you are signed in.

When you are finished answering the multiple choice test, click on the **Finish** button to receive your score and save your data.

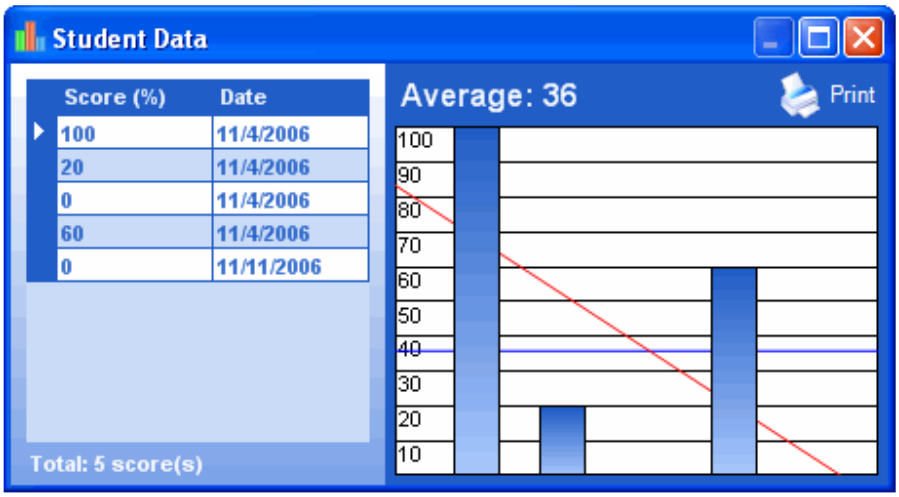
Viewing Data

Once you are signed in and have taken at least one multiple choice test, you can view your data. To view data, click on the **Data** icon on the *Main Toolbar*, or go to the menu and select **Data** → **View**.

The *Student Data* screen displays all of your scores along with a chart. There are several features available on the *Student Data* screen, including:

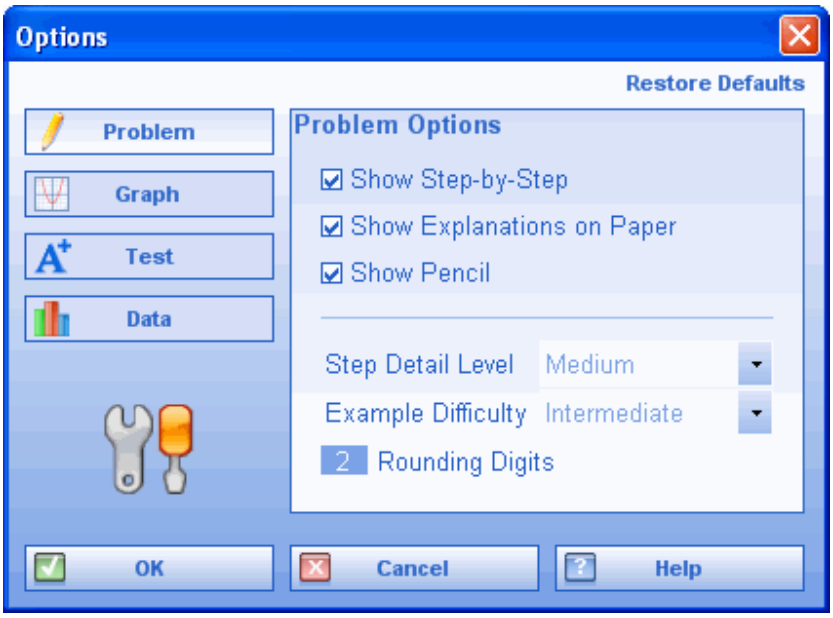
- **Regression** – A regression line is drawn on the chart, which shows the general trend of your scores. If your scores are increasing, the line will slope upwards and be colored green. If your scores are decreasing, the line will slope downwards and be colored red. You can show/hide the regression line by right-clicking on the chart and selecting *Show Regression*.
- **Average** – Your current average is displayed above the chart. You can also draw the average on the chart, represented by a blue line. You can show/hide the average line by right-clicking on the chart and selecting *Show Average*.

The Student Data Screen:



Options

Linear Algebra Solved! offers several options for using the software. To view the *Option Screen*, go to the menu and select **Tools** → **Options**.



Problem Options

Show Step-by-Step – Shows the solution to the problem one step at a time. If not checked, every step of the problem is displayed to the screen the first time you click the *Next* button on the *Problem* toolbar.

Show Explanations on Paper – Shows the step explanations on the paper.

Show Pencil – Shows a pencil writing the problem you are typing.

Step Detail Level – The amount of detail shown in the steps. The higher the detail, the more steps are shown on the paper while solving.

Example Difficulty – The default difficulty level when inserting example problems.

Rounding Digits – The number of digits to use if a calculation must round a number.

Graph Options

Background – Selects the background of the grid. The options are *Automatic* (the software chooses the best background depending on the graph), *Cartesian*, *Polar*, and *None*.

Color – The color used to display the grid.

Shade – Shades the graph. When printing the graph, it is good to turn this option off to preserve printer ink.

Graph Label – Selects the Axis to label. The options are *Automatic*, *X/Y Axis*, *All X*, *All X/Y*, or *None*.

Increment – The size of the squares on the display grid.

Pi-Based X-Axis – Displays the x-axis in terms of Pi.

Quadrants – Labels all four quadrants.

Intersections – Displays the point(s) of intersection of all items currently on the graph (not including points and segments).

X/Y Axis – Displays black lines at x=0 and y=0, intersecting at the origin.

Rounding Digits – The number of digits to use if a calculation must round a number.

Test Options

Problem Difficulty – The default difficulty level when selecting subjects for the test.

Multiple Choice Options – The maximum number of multiple choice answers available when taking a multiple choice test.

Font – The font style used when creating the tests.

Font Size – The font size used when creating the tests.

Data Options

Data Mode – The mode used to display the data.

Bar Graph Color – If the *Data Mode* is set to *Bar Graph*, this is the color used to display the bars.

Show Scale – Displays the vertical grading scale (0-100).

Label Points – Labels the points for all data modes except *Bar Graph* mode.

Show Regression – Draws a regression line on the chart, displaying the general trend of the scores. If the trend is increasing, the regression line is green and slopes upward. If the trend is decreasing, the regression line is red and slopes downward.

Show Grid – Displays the horizontal grid on the chart.

Show Average – Draws a blue line on the chart displaying the average score of the data.