Short CaluMath Page Maker Tutorial

This tutorial will demonstrate the construction of functions and the creation of axes, graphs of functions, points, tangent lines and line segments. It will also demonstrate how to enable dragging of points on the page so that the graphs can be moved to new positions. It will also cover how CaluMath pages can be saved and how graphic images (that can be imported into other documents) are made.

Preparation:

To construct a CaluMath web page, you need to download the CaluMath Page Maker to your computer. Go to the current version of CaluMath at http://www.calumath.org/CaluMath/CaluMath Home Page.html, click on the download link, and download the zip file to the desktop your computer, and unzip it there. This should created a folder named CaluMath on your desktop. Depending on how you unzipped the file, the CaluMath folder may be inside a folder. Note that once the CaluMath folder is created, it can be placed anywhere on your computer. The only restriction is that it cannot be placed in a folder that has CaluMath as part of its name.

Open the CaluMath folder on your computer, and use the **Firefox** web browser to open the file named CaluMath_Page_Maker.html that is inside the CaluMath folder. If you do not know how to open the file with Firefox, do the following: right click on the file, and in the menu that pops up, go down to Open With, and click on Firefox in the new small menu that pops up. If Firefox does not appear in the small menu, click on Choose Program and look for Firefox there. Although the CaluMath Page Maker can be opened in any web browser, Firefox provides helpful warnings which can often be used to find errors, for example, if you type sinn(pi) instead of sin(pi).

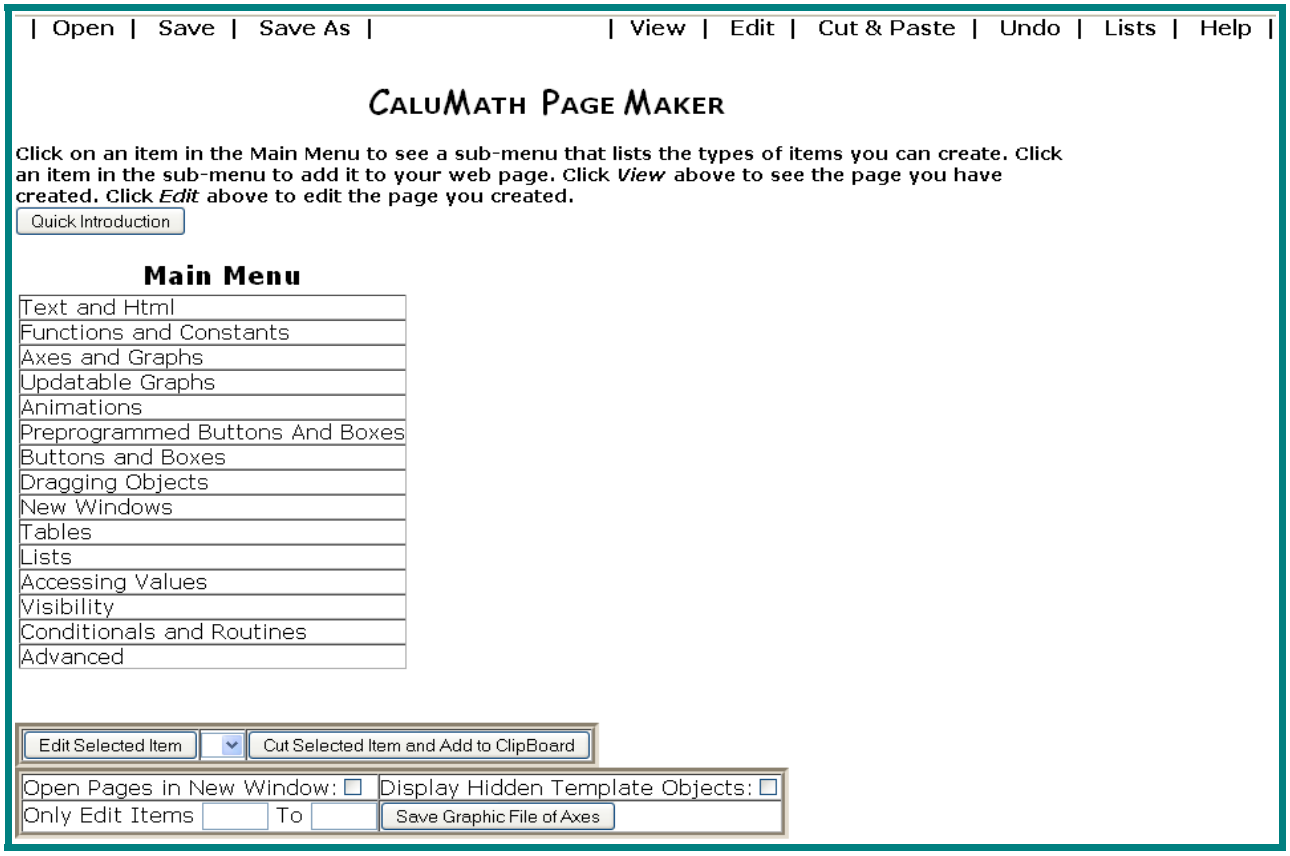
Since you will open the CaluMath Page Maker from a file on your computer, a few words are in order. Any modern version of the major web browsers will open CaluMath pages on the internet. If you want to open CaluMath pages that are on your hard drive, both Internet Explorer and Google Chrome require you to adjust a setting to allow you to do this. In Internet Explorer, go to the menu bar, click Tools and then Internet Options. In the small window that opens, click Advanced and scroll down until you see Security. Click the box that says Allow active content to run in files on My Computer. After you have done this, close out of the window and restart Internet Explorer. To open CaluMath pages stored on your hard drive in Google Chrome, go to any icon from which you would open Google Chrome. Right click on the icon and click Properties. In the window that opens, look at the entry in the Target field. It indicates the path to the Google Chrome program. The path will probably be enclosed in quotes. Leave the path that is there. After the quotes that end the path, enter --allow-file-access-from-files. Note that this starts with two dashes. Click OK. Then open Google Chrome.

Once you have the CaluMath Page Maker opened, you should observe the following precautions:

1. Never use your browser's back or forward buttons. If you navigate away from the CaluMath Page Maker, you will lose any unsaved information.
2. If your web browser has a pop up blocker, it should be turned off. To do this in Firefox, go to Tools and then Options. Click the Content item and then make sure that Block pop-up windows is unchecked. After doing this, you may need to close your browser and then open it again for

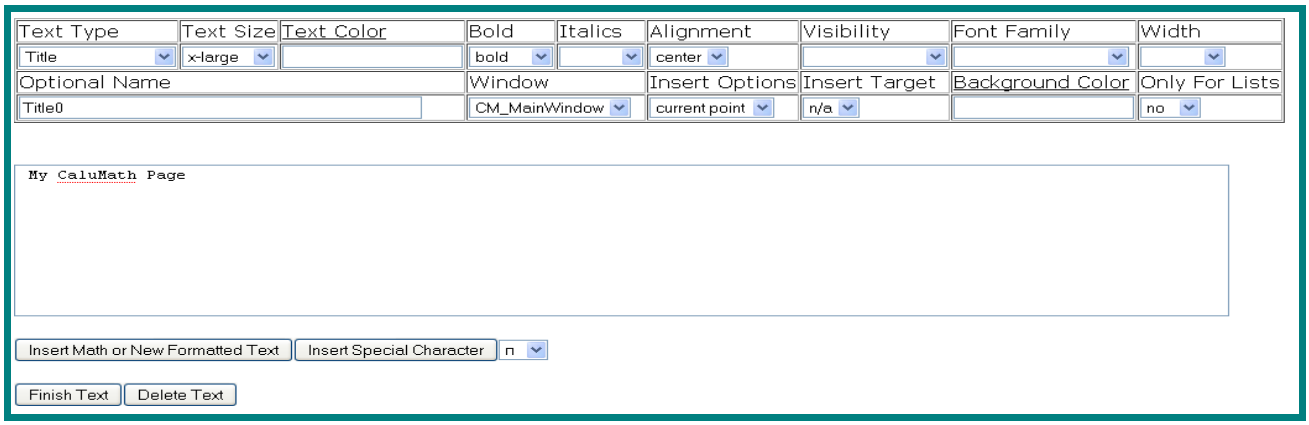
the changes to take place.

Below is a screen shot of the CaluMath Page Maker. If you click on an item in the Main Menu, a sub-menu opens listing the items in that category that can be created. Clicking on an item takes you to a screen for the creation of that object. Each type of object has options pertaining to it from which you can select. When you are finished creating the object, you exit the screen and are returned to the main window of the CaluMath Page Maker with the Main Menu visible. After creating one or more objects, you can click the View item at the top of the page to see the page you have created. If you click the Edit item, you are taken to a screen that lists the items you have created; clicking on an item takes you back to the screen where the item was created. You can also edit an item by selecting it from the menu that appears below the Main Menu and clicking the Edit Selected Item button.

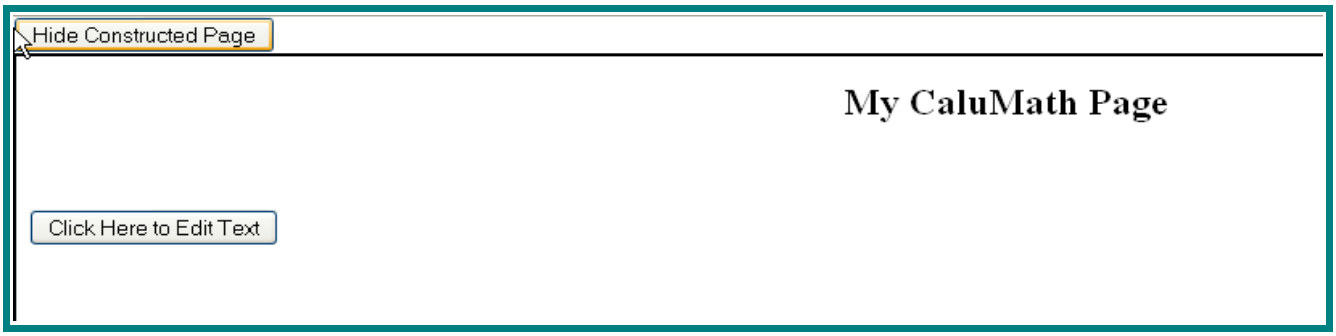


We will begin by creating a title for our page, we will define several constants and functions, and create several graphs. This will give us a feel for how the CaluMath Page Maker functions and also allow us to discuss several key ideas that are important to keep in mind while constructing CaluMath web pages.

Title: To construct a title, click the Text and Html item in the Main Menu and click Text in the sub-menu that opens. A screen dealing with the creation of text opens; a screenshot of it is below. Select *Title* in the Text Type menu, in the Text Size menu select *x-larg*e, in the Bold menu select *bold*, select *center* in the Alignment menu, and then type the text for your title in the large text area as is shown in the screen shot below. Click the Finish Text button, which returns you to the CaluMath Page Maker main window.



View Page: To view the page we have created so far, click the View item at the top of the page. The page we are creating will appear in a box, whose technical name is an iframe, that appears near the bottom of the CaluMath Page Maker. The page contains the title we are creating and an extra button labeled Click Here to Edit Text. This button only appears while you are constructing the page with the CaluMath Page Maker; after you save your page this button will not appear when you open it in a web browser. Click on the button now, and then click on the title and observe that it takes you back to the screen where you created the title. You can modify the title if you want; click the Finish Text button to return to the CaluMath main window.

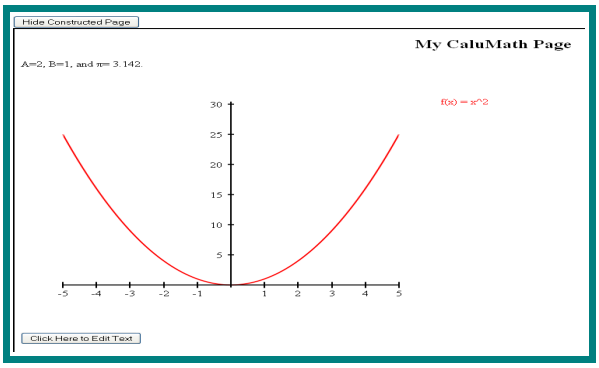


Functions: We now define the function f(x) = x^2. In the Main Menu, click Functions and Constants and click Define a Function in the sub-menu. Two tables appear, the lower table contains required fields that need to be filled out. The upper table contains options that, for now, can be ignored. The help button yields extensive help, since you can use the options table to create very powerful, and easy to use, functions (which we will see in a few minutes). For now, enter *f* in Function Name, *x* in Function Variable, and *x^2* in Function Definition. Although we do not need them here, keep in mind that you should liberally use parentheses to ensure your expressions are interpreted correctly. You also must use a * symbol to denote multiplication. Click the Finish Define A Function Button.

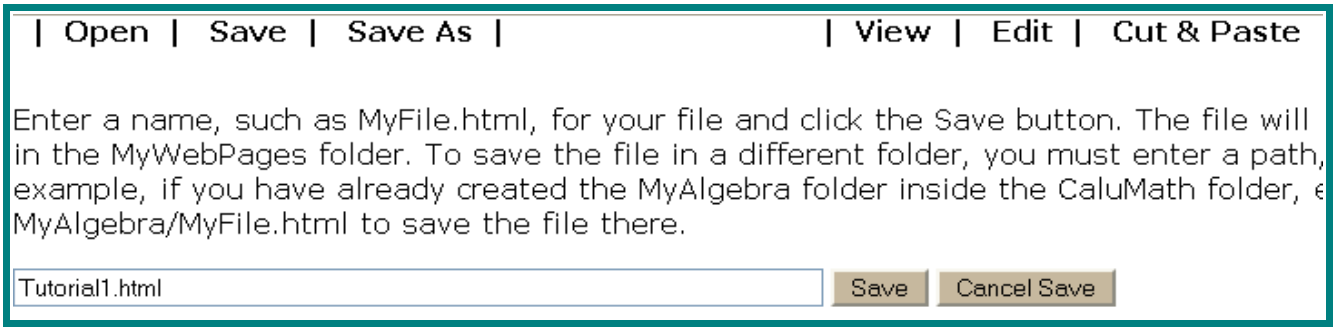
Axes: We now define a set of axes. In the Main Menu, click on Axes and Graphs and click on Draw Axes in the sub-menu. There are a large number of options for axes, as evidenced by the large table above the Help for Draw Axes button. For the moment, we will ignore all of the options. Almost every object in CaluMath must have a name; so enter *Axes1* in the Axes Name field. You can leave the default values of *6* and *5* for Plot Width and Plot Height, this corresponds to 6*72=432 and 5*72=360 pixels

on your computer screen, or 6 inches by 5 inches if you print the axes on a piece of paper. Alternately, you can enter the number of pixels directly into the Plot Width and Plot Height fields (CaluMath will interpret any large number in these fields as being in pixels). Let us change the Beginning and Ending X values to *-5* and *5* respectively. We can leave the beginning and ending Y values with the word *default*; this will allow the axes to automatically adjust to the graphs we plot. Click the Finish Draw Axes button.

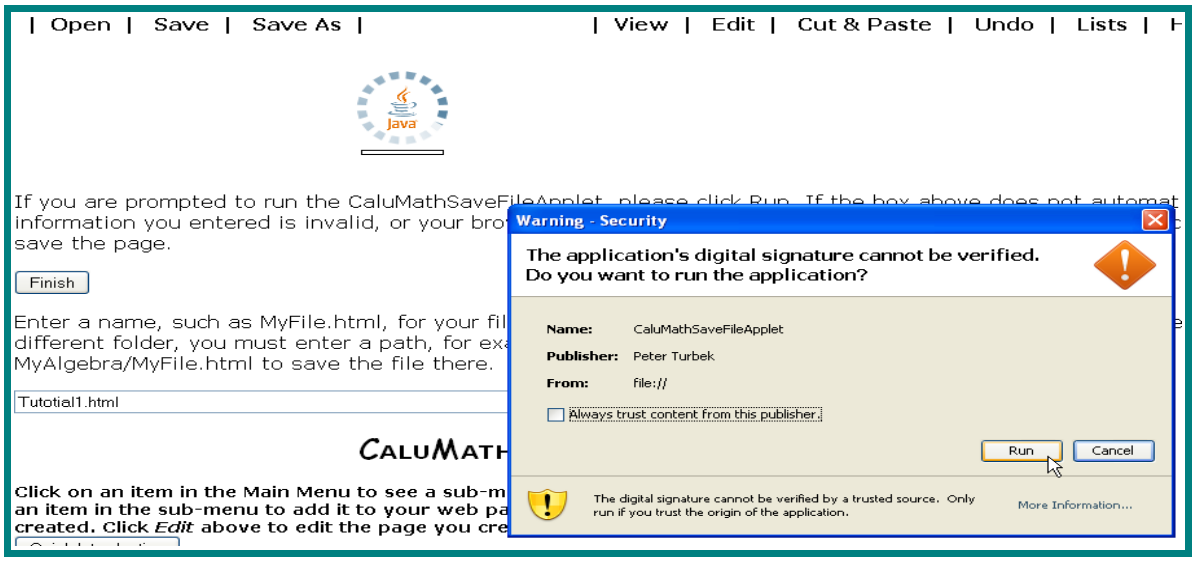
Graphs: We now graph the function f(x) = x^2. In the Main Menu, click Axes and Graphs and click Graph of a Function in the sub-menu. In the screen that opens, menus will list all of the axes you have constructed and all of the functions you have defined. In the Axes field, select *Axes1* (there will be no other choice, since we have not created other axes) and in the Function field, select *f*. Leave the word *default* in the Beginning and Ending X Value fields, this will cause the graph of f to begin and end at the beginning and ending x values of the axes (which we had defined to be from -5 to 5 above). In the options field, note that Plot Style defaults to *normal* (instead of thick or thin), and Display Equation defaults to *yes*. This latter value means that the equation f(x) = x^2 will be displayed to the right of the axes when the graph is constructed. Click the Finish Graph Of A Function button. Upon returning to the main window, click the View item to view our page. It should look like the screen shot below.



Saving Your Page: Click the Hide Constructed Page button to return to the main window. At the top left, click the Save item. Enter the name Tutorial1.html in the text box. Note that all file names should have the extension .html to indicate that they are web pages. The file will be saved in the MyWebPages folder inside the CaluMath directory.

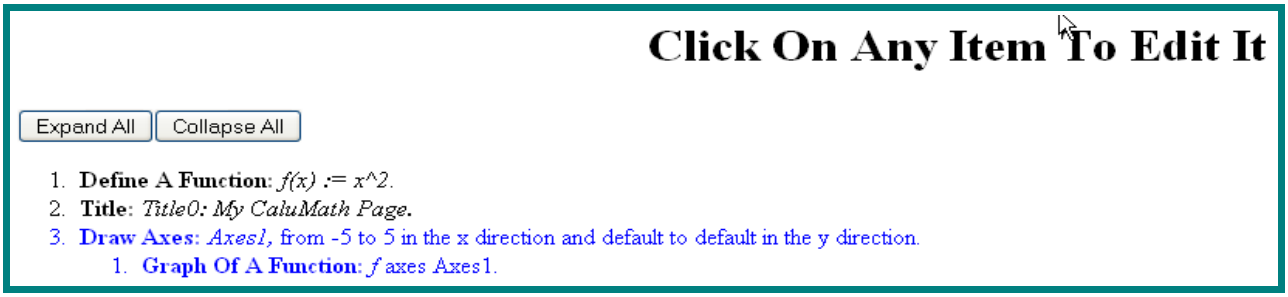


When you click Save, a Java applet will appear, asking for your permission for the web page to save the file to your hard drive. Click Run to run the applet and save the file.



If you now minimize the CaluMath Page Maker and go to the MyWebPages folder inside the CaluMath directory, you should see the file Tutorial1.html. If you open it in a web browser, you will see the page you have created. Note that the Click Here To Edit Text button, which was visible when the page was viewed in the CaluMath Page Maker, is no longer visible.

Editing the Page: There are two ways to edit the page, and we will illustrate both of them now. From the CaluMath Page Maker main window, click the Edit item at the top right. A window opens that lists each element you created in your page. Here is a screenshot.



Notice several things about the items we created.

1. When you define constants and functions, CaluMath usually places them at the top of your web page in the order that you define them. In the page we are constructing, even though we constructed Title0 first, CaluMath places the function f before it. This is done so that you can access functions and constants anywhere in your web page (because they will automatically appear before items such as paragraphs and axes). If you decide, as you are constructing your page, that you should have defined new constants and functions, then you can do this without worry; CaluMath will automatically place them at the top of your page so they will be available to objects you previously created. There are exceptions to this rule; we will see one in a few minutes.

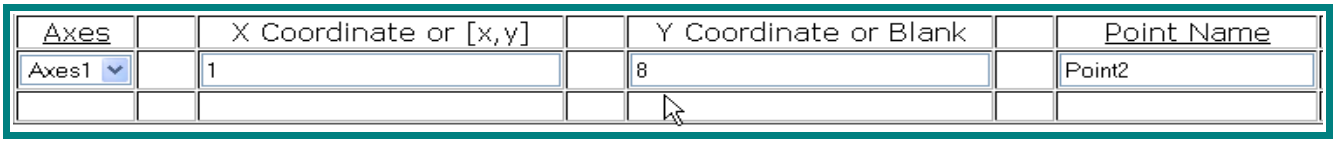
2. Some items, such as the axes Axes1, contain children. In the above screenshot, note that the graph of f is a child of Axes1. This is done so that if we remove Axes1, all of its children will also be removed.

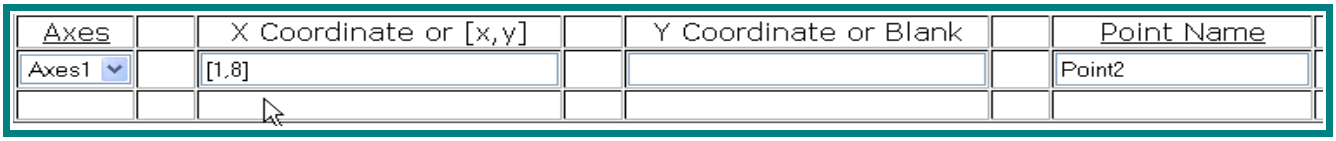
To edit an item, simply click anywhere near the middle of the line that lists the item. Do not click on the number at the beginning of the line. For practice, let us edit Axes1. Click somewhere near the middle of the line that says *Draw Axes: Axes1, from -5 to 5 in the x direction and default to default in the y direction*. This returns us to the screen where we constructed Axes1. Change the Beginning Y value (which was *default*) to *-5*. Click the Finish Draw Axes button to close the screen and return to the main window.

Another Way To Edit: We will now edit Axes1 again (for practice) by using the drop down menu below the Main Menu. Editing using this menu is generally faster than using the Edit item at the top of the main window, because the Edit item requires the Edit window to load, which can cause a small delay if the page is large. The items in the Edit drop down menu are organized in the same way as those in the Edit window, in fact, they have the same numbering system. Note that Axes1 is item 3, and you can see that the graph of f is a child of the axes. Select Axes1 (which should be listed as *3. Draw Axes named Axes1*) and click the Edit Selected Item button. This returns us to the screen where we Axes1. Since I merely wanted to illustrate this way of editing, we will not make any changes to the axes. Click the Finish Draw Axes button to close the screen and return to the main window.

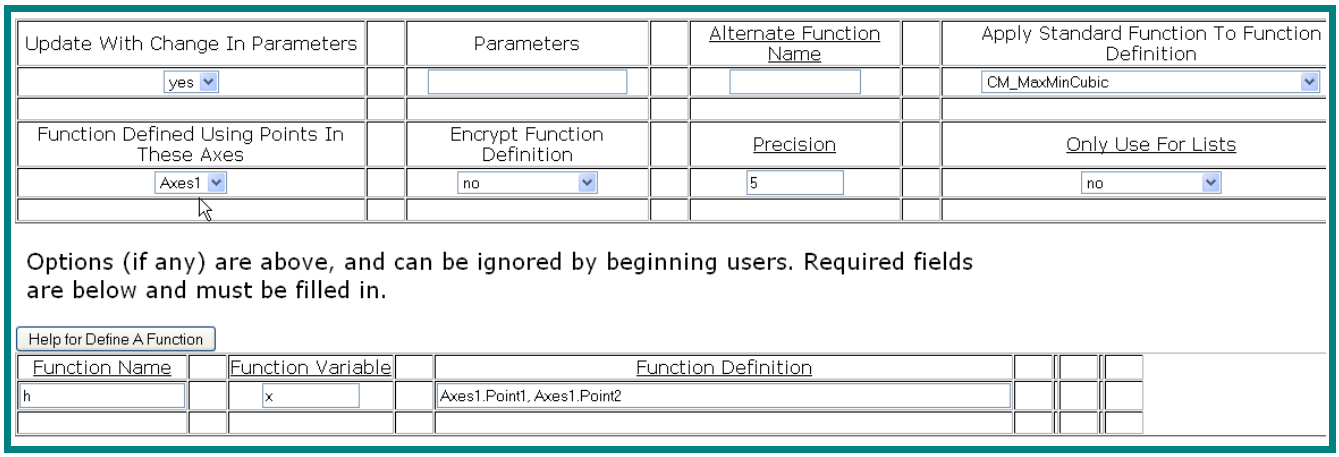
We will now plot two points in Axes1 and graph a cubic whose local maximum and minimum occur at the points. We will then enable the points to be dragged; dragging the points will update the graph of the cubic curve.

Points: We now plot points at (-2,20) and (1,8) in Axes1. In the Main Menu, click the Axes and Graphs item and click Plot A Point in the sub-menu. We will only concern ourselves with the required table at the bottom of the screen that appears. CaluMath suggests a name for the point, however type *Point1* in the Point Name field. We have two choices, we can enter the x and y coordinates of the point (-2,20) separately by entering *-2* in the X Coordinate or [x,y] field and entering *20* in the Y Coordinate or Blank field. Alternately, we can enter *[-2,20]* in the X Coordinate or [x,y] field and leave the Y Coordinate or Blank field blank. This feature is true for most CaluMath fields that require x and y coordinates, you can enter them separately, or you can enter the ordered pair, enclosed in brackets, in the x coordinate field. **Please note that coordinates are always enclosed in brackets, not parentheses.** The reason for this is that coordinates are technically arrays of numbers (meaning a list of numbers) and most programming languages denote lists by enclosing the entries in brackets. Click the Finish Plot a Point and Do Another Plot A Point button to create the second point. Enter the name *Point2* in the Point Name field, enter *[1,8]* in the X Coordinate or [x,y] field and click the Finish Plot A Point button to return to the main window. Recall that the true name for these points are Axes1.Point1 and Axes1.Point2 because they are plotted in Axes1. Below are screen shots of the two ways to correctly enter the coordinates for Point2.





Standard Functions: We will now define h to be the cubic that has its local maximum and minimum at Point1 and Point2. In the Main Menu select Functions and Constants and click Define a Function in the sub-menu. Below is a screen shot of what you should enter. After the screen shot, we will discuss each entry individually.



1. In Apply Standard Function to Function Definition, select *CM_MaxMinCubic*. This instructs the CaluMath Page Maker that you want to define a cubic whose maximum and minimum occur at prescribed values.
2. In The Function Definition, enter *Axes1.Point1, Axes1.Point2*. This indicates the two points through which the cubic should go. CaluMath will automatically define the correct function for us. There are a variety of ways you can enter this information; we list some of them here. All of the following produce a cubic whose maximum and minimum lies at the points (-2,20) and (1,8):

   a) Axes1.Point1, Axes1.Point2

   b) Axes1.Point1, [1,8]

   c) Axes1.Point1, 1,8

   d) [2,15],[1,8]

   e) 2,15,1,8

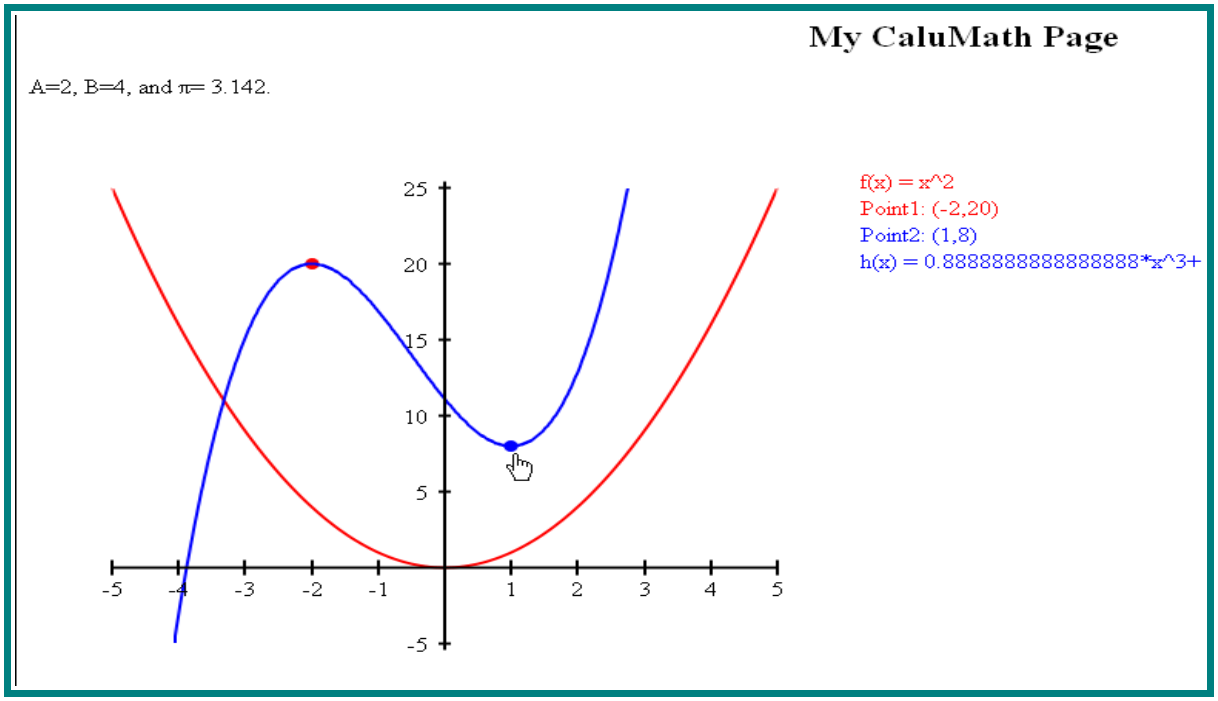
   In general, CM_MaxMinCubic expects an entry of the form x1,y1,x2,y2, however it recognizes that names of points or coordinates of points will account for two coordinates. Please note that the following should not be used: 2,[15,1],8, since [15,1] is not the coordinates of a point on the graph of h.
3. In Function Name enter *h* and in Function Variable enter *x*. This means that the function will be defined in terms of the variable x (you could chose a different variable, such as t if you desire).
4. In Function Defined Using Points In These Axes select *Axes1*, since the function will only make

sense if it is placed as a child of Axes1. If this is not done, CaluMath will place the definition of the function at the top of the page and the page will not load correctly since Axes1.Point1 and Axes.Point2 will not have been constructed yet.

5. In *Update With Change In Parameters*, select *yes*. A complete discussion of parameters will take us too far afield at this juncture, however this item deserves some discussion at this point. The definition of h depends on the position of the points Axes1.Point1 and Axes1.Point2. We have two choices: if the points are moved we can redefine h to be the function whose graph goes through the points' new positions, or we can decide to not change the definition of h, so that its definition is no longer tied to the positions of the points Point1 and Point2. In our case, we want the user to drag the points and update the graph, therefore we select *yes* in this field.

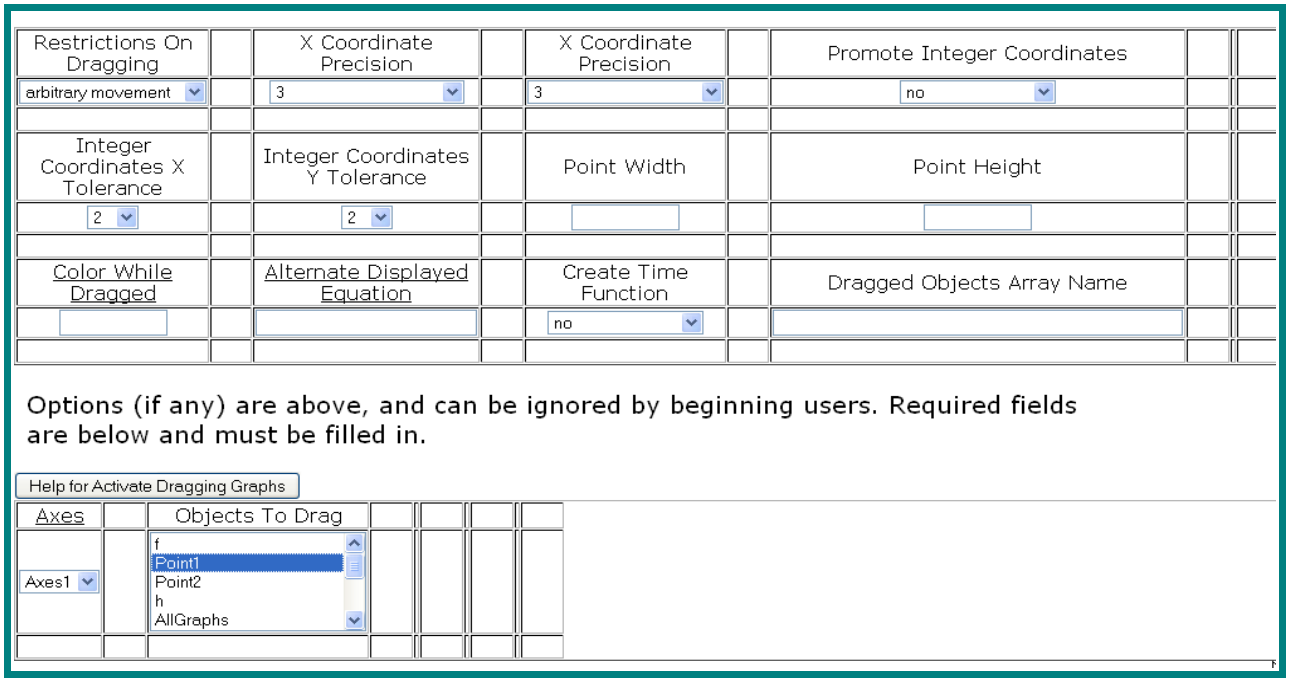
   In this case, Axes1.Point1 and Axes1.Point2 are considered parameters for the function h, since the definition of h depends on them. CaluMath is usually quite good at determining parameters for functions. There may be an occasion, however, where you want to declare parameters for a function. If so, you would enter the parameters in the *Parameters* field and enclose them in square brackets, for example you could enter *[Axes1.Point1, Axes1.Point2]*. However, this is completely unnecessary in the present case, since CaluMath will determine that Axes1.Point1 and Axes1.Point2 are parameters for h. Click the Finish Define A Function button to return to the main window.

Graph h: We now graph the function h. In the Main Menu, click Axes and Graphs and click Graph of a Function in the sub-menu. In the screen that opens, select *Axes1* and in the Function field, select *h*. Leave the word *default* in the Beginning and Ending X Value fields, this will cause the graph of f to begin and end at the beginning and ending x values of the axes. Click the Finish Graph Of A Function button. Click the View item to view your page. Below is a screen shot of the page we constructed.



Note that the defining equation of h displayed is awkward, there is really nothing that can be done about this, except for editing h and choosing not to display the equation.

Dragging Graphs: We now activate Axes1 so the user can drag points. In the Main Menu, click Dragging Objects and click Activate Dragging Graphs in the sub-menu. Below is a screen shot; we will discuss many of the items individually.

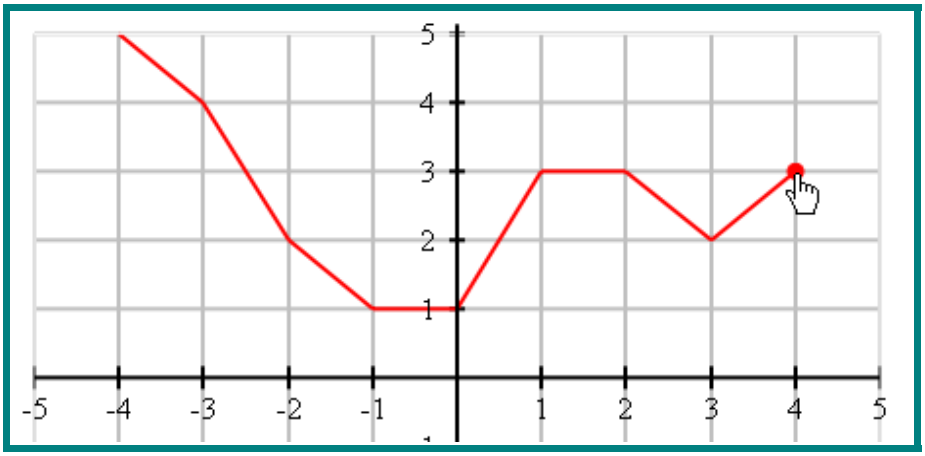


1. **Objects to Drag:** There are a variety of choices for Objects to Drag, and you may select multiple items. The four items that are draggable in Axes1 are the two points and the graphs of f and h. You can also select categories of objects to be dragged, such as all points or all graphs. Select Point1 and Point2 by clicking down on Point1 and then holding the Ctrl key on your keyboard and clicking on Point2.
2. **Restrictions on Dragging:** select *arbitrary movement*. Selecting *x always increasing* is appropriate for when you want to capture the user's mouse movement and use it to define a function. In that case any motion of the mouse from right to left is ignored, so that a well defined function can be created.
3. **X Precision and Y Precision** rounds the coordinates of the mouse while dragging to a specified number of decimal places. You can also select .25 or .5 to round off the coordinates to the nearest fourth or half respectively. If you select CM_DragXPrecision or CM_DragYPrecision, it means that you have previously defined the constants CM_DragXPrecision and CM_DragYPrecision to be one of the numbers 0, 1, 2, … ,12, .25 or .5. In that case, the vales these constants define will be used in rounding.

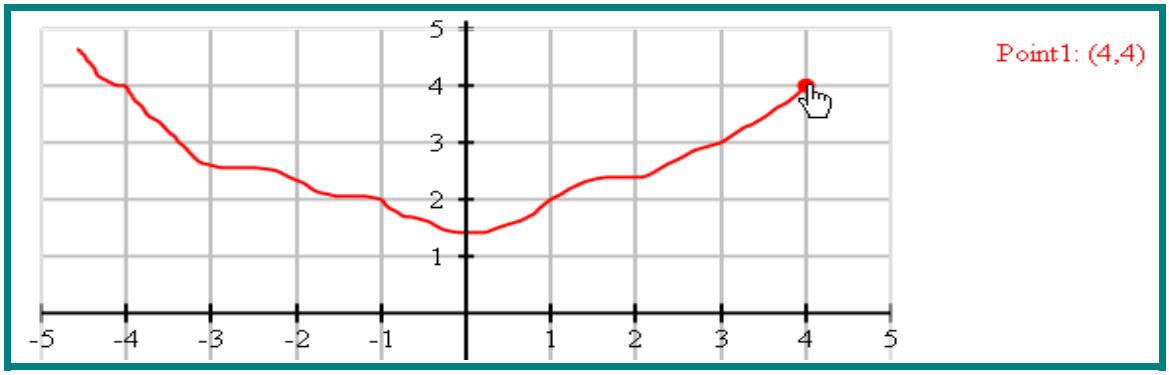
   Rounding is a very important consideration when designing a page which includes graphs to be dragged by the user. For example, suppose you ask the user to drag a graph of a function h so that h(1) = 7. To do this, you would probably want the Y precision set to either .25, .5 or 0, so that the user has an easier time of obtaining integer y values. If you set Y Precision to 3, there is a good chance that the user would obtain h(1) = 7.012 or h(1) = 7.004, but will not achieve an

integer value for h(1). Often selecting .25 for X Precision and either .25, .5 or 0 (depending on the scaling in the y direction) is appropriate for Y Precision. **For your page, select *.25* for X Precision and *0* for Y Precision.**

4. **Promote Integer Coordinates:** is another way CaluMath enables the user to be successful dragging their mouse over a desired point with integer coordinates. One might think that selecting X Precision and Y Precision to be 0 might be the best way to ensure that a graph will have integer coordinates. Unfortunately, this choice leads to graphs such as the one below, in which the page captured the user's mouse movements and used them to create a graph. Clearly this type of graph consists of straight segments, which may seem slightly unnatural for the user, since the path of their mouse probably will not consist straight paths. The graph does have the property, however, that it goes through many points with integer coordinates.



As an alternative, the graph below was obtained by setting the X and Y Precision to 3, however *yes* was selected in Promote Integer Coordinates and both **Integer Coordinates X Tolerance** and **Integer Coordinates Y Tolerance** were set to *4*. The effect of this is that a typical mouse coordinate is rounded to 3 decimal places, however when the mouse is within 4 pixels in the x and y direction of a point with integer coordinates, the mouse moves to the point with integer coordinates, and the rounded mouse position is captured. In the screen shot below, you can see that the graph, which was drawn freehand on the computer screen, is much more natural, however it goes through many points with integer coordinates (for example (4,4)), even though most coordinates were rounded to 3 decimal places.

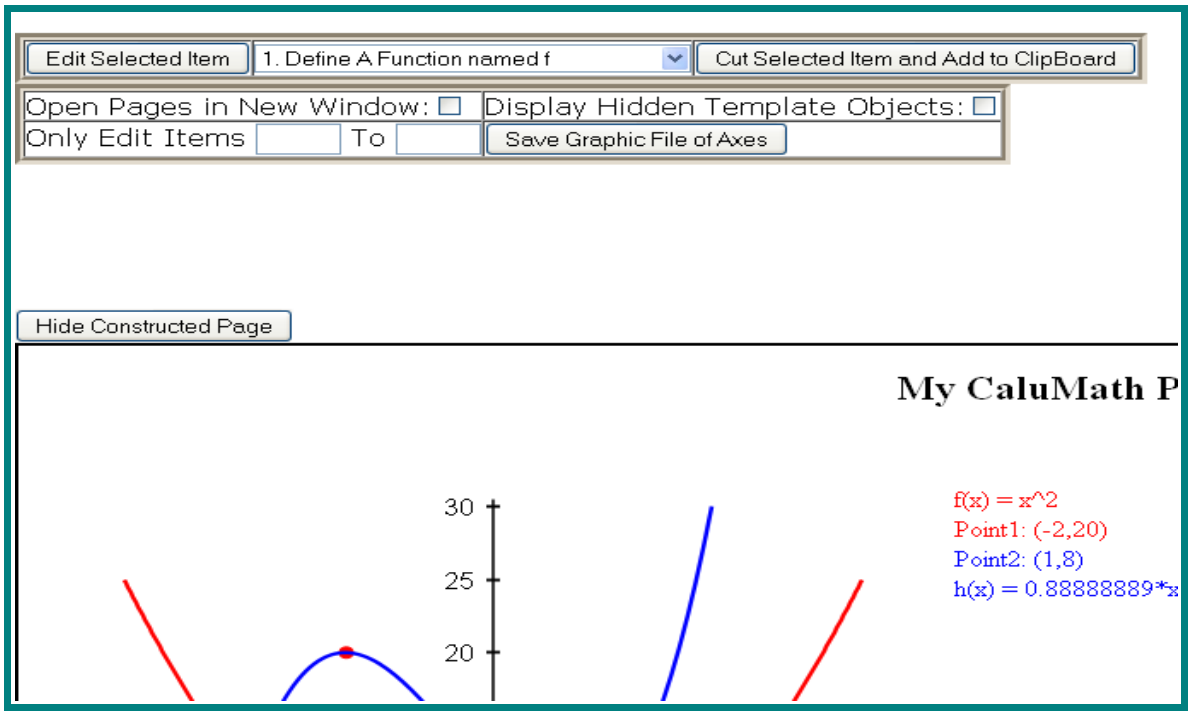


For our page, we are not capturing the user's mouse motion, we are only interested in allowing them to move Point1 and Point2. Therefore select *no* in Promote Integer Coordinates. Because we selected *no*, any selection in Integer Coordinates X Tolerance and Integer Coordinates Y Tolerance is ignored.

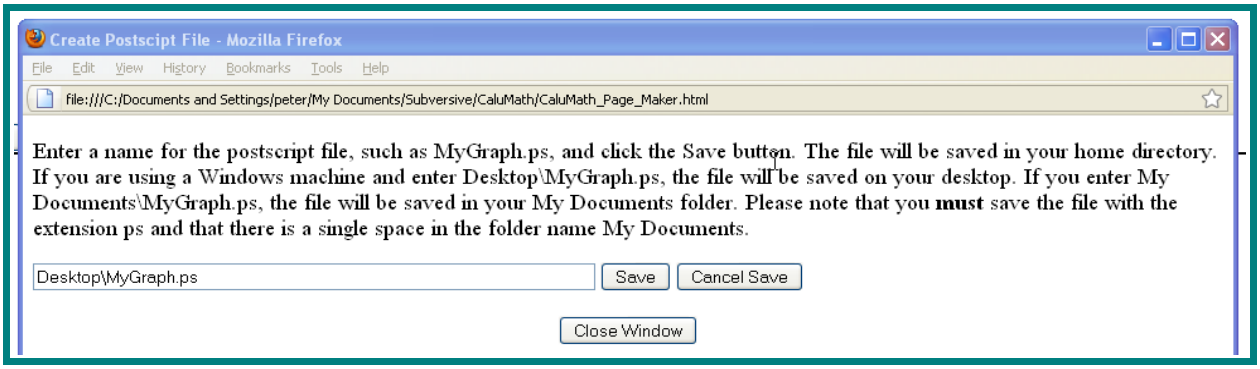
5. **Create Time Function:** This allows you to capture the user's mouse movements and the time when the user's mouse was at that position. This can be used to construct an animation that replays the motion of the user's mouse. We have no need for this at this time, therefore leave the default value of *no* in Create Time Function.

Click the Finish Activate Dragging Graphs button to return to the main window. Click the View item to view your page and drag Point1 and Point2 to new positions and observe that the definition of h is updated and the graph reflects the new definition of h.

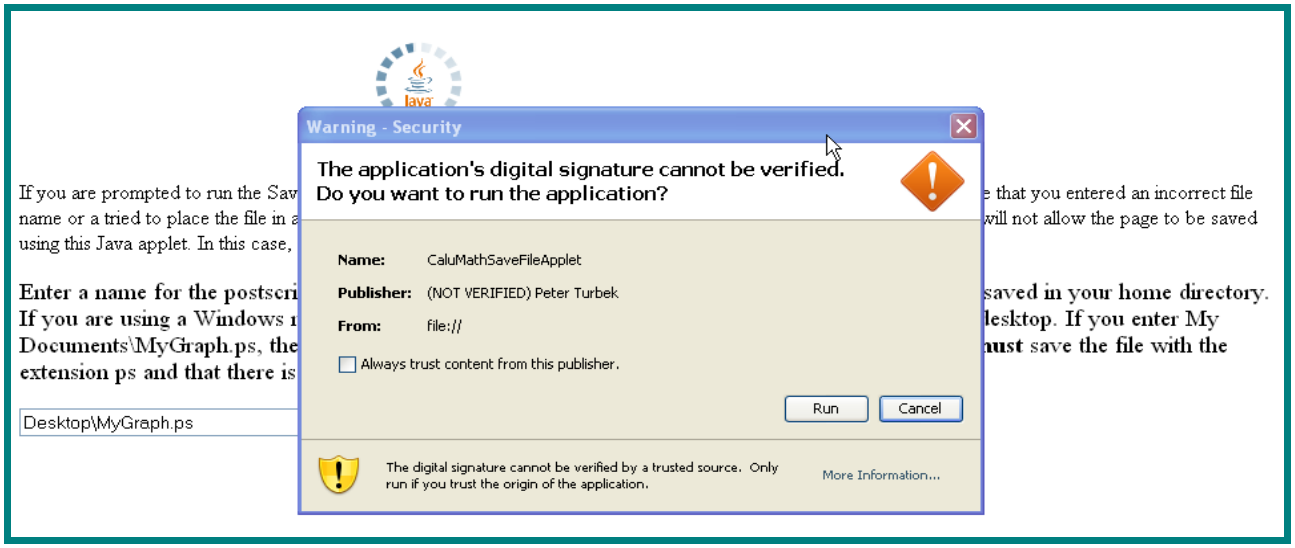
Graphic Image: We will now construct a graphic image of Axes1 that can be placed inside a document such as a Word document. Click the View item, if you have not already done so, to view the page and interact with the graph. When you have dragged the points to the positions you want, scroll up a bit until you can see the table below the Main Menu. Click the button that says Save Graphic File of Axes. See the screenshot below.



After clicking the Save Graphic File of Axes button, a drop-down menu and two buttons appear. The drop-down lists the axes that have been constructed already. Since we have only constructed Axes1, it is automatically selected in the drop-down. Click the Finish Saving Graphic button. Once this is done, a new window opens that allows you to enter a name for the file. If it does not already appear in the text box, enter Desktop\MyGraph.ps. **Since the file will be a Postscript file, you must give the file name the extension ps.** Click the Save button. See the screenshot below.



After clicking the Save button, a Java applet will run that saves your file. It will ask for your permission to run. Click Run.



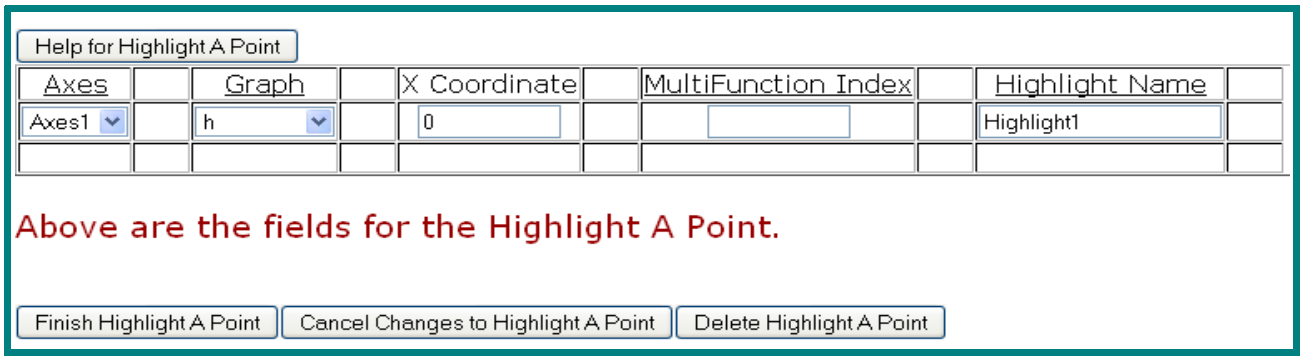
After the applet runs, the window lists the full path to the directory where the file was saved. It also provides a link to a free, online file conversion website (that is not associated with CaluMath). If you do not have file conversion software on your computer, you can click the link to have the file converted from Postscript into another format (such as a gif, png, or bmp) so you can include it in another document. Close the window by clicking the Close Window button.

Save Your Page: At this point you should save your page by clicking the Save item at the top left of the main window.

We will now highlight the point on the graph of h that has an x coordinate of 0, and draw a tangent line there.

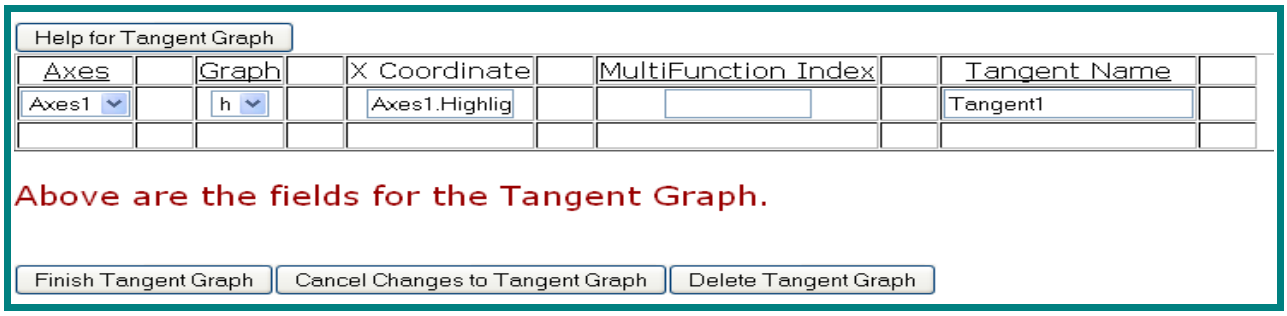
Highlight A Point: When we plotted Point1 and Point2 above, we had to enter x and y coordinates for each point. When you Highlight A Point on the graph of a function, you only need to give the x coordinate, since the y coordinate will be calculated for you so that the point lies on the graph of the function. From the Main Menu, click Axes And Graphs, and then click Highlight A Point. We only need to consider ourselves with the required table in the screen that opens.

Enter the values indicated in the screenshot below.



Click the Finish Highlight A Point button to return to the main window.

Tangent Line: We now draw a tangent to the graph of h at the point Highlight1. From the Main Menu, click Axes And Graphs, and then click Tangent Graph. We only need to consider ourselves with the required table in the screen that opens. Here is a screenshot.



Select *h* in the Graph drop-down and enter *Axes1.Highlight1* in the X coordinate field. Note that you must enter the full name of the highlighted point which is *Axes1.Highlight1* and not just *Highlight1*. CaluMath will recognize that this is the name of a point and use the x coordinate of the point to determine where the tangent should be drawn. Give the tangent the name Tangent1. Click the Finish Tangent Graph button to return to the main window.

Click the View item at the top of the main window to view your page. Note that when you drag Point1 and Point2, the tangent line is automatically redrawn. Unfortunately, note that Highlight1 cannot be dragged. This is because we only enabled Point1 and Point2 to be dragged in the Activate Dragging Graphs screen. We can rectify this now by editing the Activate Dragging Graphs object we previously created.

Editing the Page: We will now edit the Activate Dragging Graphs object by using the drop down menu below the Main Menu. Note that Activate Dragging Graphs is item 4. Select this item and click the Edit Selected Item button. This returns us to the screen where we enabled graphs to be dragged. In the Objects To Drag field, scroll down and select *AllPoints*. This will allow all points in the axes to be dragged. Click the Finish Activate Dragging Graphs button to return to the main window.

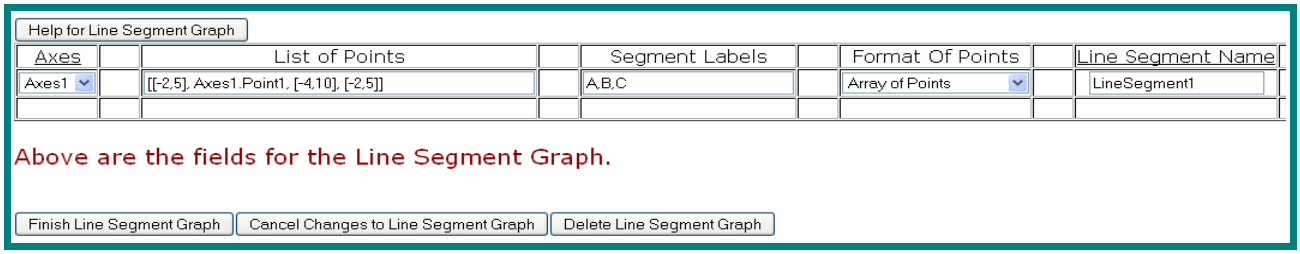
Click the View item at the top of the page to view the page we have constructed. Note that if you drag

Highlight1, the tangent moves with it. This allows you to see how the tangent line changes as the point of tangency changes. In addition, Point1 and Point2 can still be dragged, allowing us to see how changes in the graph affect changes in the tangent line. There is a problem with the page however. Note that as Highlight1 is dragged, sometimes it does not appear to be exactly on the graph of h. This is because we chose to round off y coordinates while dragging to be 0 decimal places. This sometimes rounds Highlight1 off the graph of h. We will edit the Activate Dragging Graphs object again to change the y precision to 1 decimal place.

Editing the Page: We will now edit the Activate Dragging Graphs object by using the drop down menu below the Main Menu. Note that Activate Dragging Graphs is item 4. Select this item and click the Edit Selected Item button. This returns us to the screen where we enabled graphs to be dragged. In the Y Coordinate Precision field, select *1*. This will round the y coordinates of all points that are dragged to 1 decimal place and ensure that Highlight1 always appears to be on the graph of h. Click the Finish Activate Dragging Graphs button to return to the main window.

We will now graph a triangle on the axes.

Line Segment Graph: We now construct triangle with vertices (-2,5), Point1, and (-4,10) by drawing a Line Segment Graph. In the Main Menu, click Axes And Graphs and click Line Segment Graph in the sub-menu. Below is a screenshot of the required table that appears.



Give the Line Segment Graph the name *LineSegment1*. There are two common ways of indicating the points that the Line Segment Graph should go through. We will illustrate one of them now. In Format of Points, select *Array of Points*. This means that you need to enter a double array in List of Points, in other words, your entry should be of the form [[x1,y1], [x2,y2], [x3,y3], …,[xn.yn]]. This is an array (which means it begins and ends with a square brackets), and each entry in the array is an array consisting of the x and y coordinates of one point. However, if you want the Line Segment Graph to go through a previously plotted point, you can substitute the full name for the point for the corresponding x and y value. In our case, enter *[[-2,5], Axes1.Point1, [-4,10], [-2,5]]*. CaluMath will recognize that Axes1.Point1 is the name of a point and substitute the x and y coordinates of the point for it. Since the first and last point are the same, the figure will be closed, so we obtain a triangle. Finally, to label the sides of the triangle, enter *A,B,C* in the Segment Labels field. Click the Finish Line Segment Graph button to return to the main window.

Click the View item at the top of the page. Notice that the triangle goes through the three specified points, and as you drag Point1 the position of the triangle changes. Unfortunately, notice that the labels of the points appear inside the triangle and are not placed particularly well because the triangle is so small. We will rectify the placement of the labels by editing the Line Segment Graph.

Edit the Line Segment Graph: From the drop-down below the Main Menu, select *Line Segment Graph named LineSegment1* (which is probably item 3.6) and click the Edit Selected Item button. This returns us to the screen where LineSegment1 was created. In the options table, find the entry named Label Placement. In the drop-down menu for Label Placement, select *counterclockwise-exterior*. This means that, if the points are listed in a counterclockwise direction going around the figure, the labels will be placed in the exterior of the figure. Note that, if the points are listed in the clockwise direction, selecting *counterclockwise-exterior* for Label Placement will do the exact opposite; the labels will be placed inside the figure. Click the Finish Line Segment Graph button to return to the main window.

Click the View item at the top of the page. Notice that the triangle goes through the three specified points, and the labels appear on the exterior of the triangle.

Suppose you wanted the triangle to have vertices (-2,5), Point1, and (-4,10), however you did not want the triangle to be updated as Point1 is moved. We will edit LineSegment1 so it is not updated as Point1 moves.

Edit the Line Segment Graph 2: From the drop-down below the Main Menu, select *Line Segment Graph named LineSegment1* (which is probably item 3.6) and click the Edit Selected Item button. This returns us to the screen where LineSegment1 was created. In the top left corner of the options table, find Update When Parameters Change and select *no* in the drop-down menu. CaluMath recognizes that the LineSegment1 depends on Point1, in other words, Point1 is a parameter for LineSegment1. You can determine whether you want LineSegment1 updated or not when a parameter on which LineSegment1 changes. By selecting no, we are indicating that dragging Point1 should not cause the graph of LineSegment1 to change. Click the Finish Line Segment Graph button to return to the main window.

Click the View item at the top of the page. Notice that the triangle is now a static object on the page.

Save Your Page: At this point you should save your page by clicking the Save item at the top left of the main window.

Graphic Image: For more practice, you may want to create a graphic image of the page.

Congratulations on completing this tutorial!

How Do I Put CaluMath On My Web Site?

To place CaluMath on your web site, you merely need to copy CaluMath web pages and some supporting library files to your web site. There is nothing to install, and your web server does not have to be configured in any way. There are two ways to do this.

1. Go to the CaluMath web site, and download the zip file that contains the entire web site. Unzip it on your hard drive. Then copy the entire CaluMath folder to your web server. You can then place any CaluMath Pages you create on your web server in the MyWebPages directory.

2. To place your own CaluMath web pages on your web site, you do not need to actually upload the entire CaluMath web site to your web server as described above. We now describe the minimum number of files and folders you need to place on your web server. To do this, do the following. Go to the CaluMath web site and download the zip file that contains the entire web site. Unzip it on your hard drive. You should use the CaluMath Page Maker (run off your own computer) to create web pages. When you want to place them on your web server, this is the minimum number of files and folders you need to create.
   a) Create a folder named CaluMath on your web server.
   b) Go to the copy of CaluMath on you computer and find the library folder inside the CaluMath directory. Copy this entire folder to the CaluMath folder you just created on your web server.
   c) Copy the MyWebPages folder to the CaluMath folder you just created on your web server.
   d) Place any CaluMath pages you create in the MyWebPages folder on your web server.

After you have completed either steps 1) or 2) above, you should be able to go to any web page on your server in the MyWebPages folder and open it in your web browser and it should display correctly.

Once you have CaluMath on your web server, you may want to create special folders for specific types of pages. For example, suppose you want to create a folder called Algebra in which you will place CaluMath web pages you create. To do this, you must observe the following.

1. The Algebra folder must be created somewhere inside the CaluMath folder. The Algebra folder can be placed directly inside the CaluMath folder, or it can be placed in any folder inside (or a folder inside a folder inside etc.) the CaluMath folder.
2. The following files must be placed inside the Algebra folder: *place_this_in_folder_with_web_pages_vml.html, place_this_in_folder_with_web_pages.svg, place_this_in_folder_with_web_pages.js, and place_this_in_folder_with_web_pages.html.* These files are necessary for the CaluMath pages in the Algebra folder to work correctly. You can copy and paste them from the MyWebPages folder into the Algebra folder.
3. **Never delete the four files above from the MyWebPages folder.**