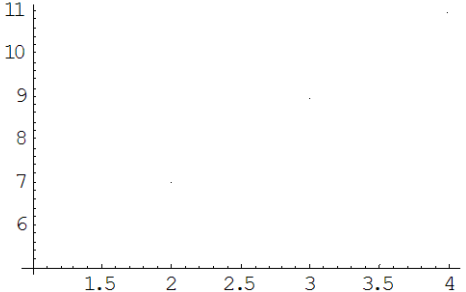
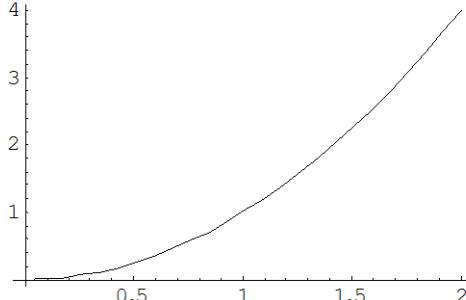
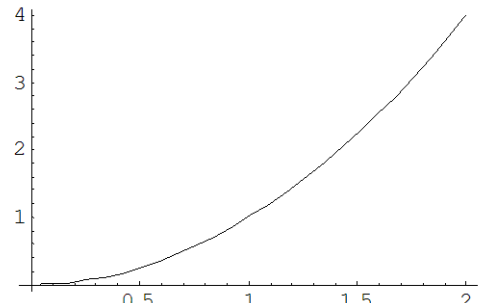
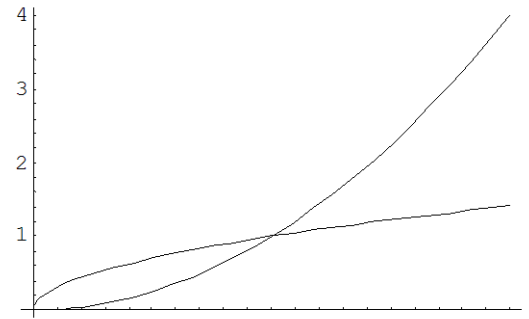
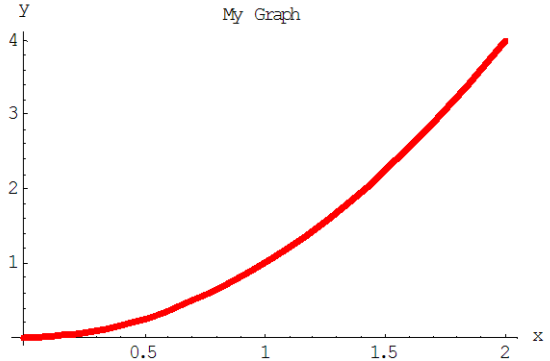


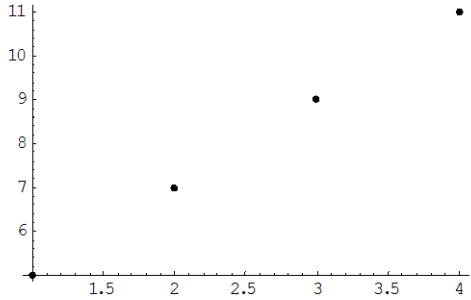
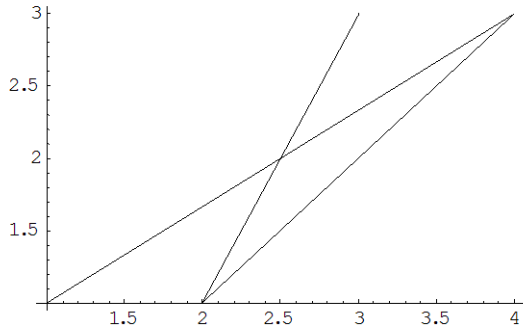
**MT 1190 - Precalculus**  
**Mathematica Command Sheet**

Topic	Examples
<p><b>Numerical Approximation</b></p> <p><i>expression</i> // N gives a numerical approximation of <i>expression</i>.</p>	<pre>In[4]:= <math>\sqrt{194356}</math> // N Out[4]= 440.858</pre>
<p><b>Defining Tables</b></p> <p><i>TableName</i> = Select <b>Table/Matrix...New</b> from the <b>Insert</b> menu bar item and insert the desired table values.</p>	<pre>DataTable = <math>\begin{pmatrix} \square &amp; \square \\ \square &amp; \square \\ \square &amp; \square \end{pmatrix}</math></pre>
<p><b>Defining and Evaluating Functions</b></p> <ul style="list-style-type: none"> <li>• <math>f[x_]</math> := <i>algebraic expression</i> in x defines <b>f</b> as a function of <b>x</b></li> <li>• <math>f[xValue]</math> gives the value of the function, <b>f</b>, for <math>x = xValue</math></li> </ul>	<pre>In[7]:= f[x_] := x<sup>2</sup> In[8]:= f[3.9] Out[8]= 15.21</pre>
<p><b>Special Mathematica Functions</b></p> <ul style="list-style-type: none"> <li>• <b>Trigonometric Functions:</b> Sin[x], Cos[x], Tan[x]</li> <li>• <b>Logarithmic Functions:</b> <ul style="list-style-type: none"> <li>- Natural Log (base <i>e</i>): Log [x]</li> <li>- Log to the base "b" of x: Log[b, x]</li> </ul> </li> <li>• <b>Miscellaneous Functions:</b> Absolute Value: Abs[x]</li> </ul>	<pre>In[10]:= Sin[.7853] Out[10]= 0.707037  In[11]:= Log[2.718] Out[11]= 0.999896  In[13]:= Log[10, 1000] Out[13]= 3  In[14]:= Abs[-3.5] Out[14]= 3.5</pre>

Topic	Examples
<p><b>Making a Table Using Function Values</b></p> <p><i>TableName</i>=<b>Table</b> [{<i>x</i>, <i>f</i>[<i>x</i>]},{<i>x</i>, <i>xmin</i>, <i>xmax</i>, <i>xincrement</i>}] makes a table of <i>x</i> values in the specified range with the associated values of the function <i>f</i>[<i>x</i>].</p>	<pre>In[1]:= LineData = Table[{x, 2 x + 3}, {x, 1, 4}]</pre> <pre>Out[1]= {{1, 5}, {2, 7}, {3, 9}, {4, 11}}</pre>
<p><b>Fitting a model to a collection of data pairs</b></p> <p><b>Fit</b> [ data values, {1, <i>x</i> }, <i>x</i>] will find the <i>line</i> of best fit for a collection of data values.</p>	<pre>In[2]:= Fit[LineData, {1, x}, x]</pre> <pre>Out[2]= 3. + 2. x</pre>
<p><b>Plotting Data</b></p> <p><b>ListPlot</b> [ <i>DirectoryName</i>, <i>options</i> (separated by commas) ] plots the list of ordered pairs, called <i>DirectoryName</i>, using the <i>x</i> and <i>y</i> coordinates specified by the ordered pairs.</p>	<pre>In[4]:= ListPlot[LineData]</pre> 
<p><b>Plotting Functions</b></p> <p><b>Plot</b> [<i>f</i>[<i>x</i>], {<i>x</i>, <i>xmin</i>, <i>xmax</i>}, <i>options</i> (separated by commas) ] plots the function defined as <i>f</i>[<i>x</i>] on the interval for the variable <i>x</i> between <i>xmin</i> and <i>xmax</i>.</p>	<pre>In[6]:= Plot[x^2, {x, 0, 2}]</pre> 

Topic	Examples
<p><b>Naming a Graph</b></p> <p><i>graphname</i> = <b>Plot</b> [ <i>f</i> [<i>x</i>], {<i>x</i>, <i>xmin</i>, <i>xmax</i>}, <i>options</i> (separated by commas) ] plots the function defined as <i>f</i>[<i>x</i>] on the interval for the variable <i>x</i> between <i>xmin</i> and <i>xmax</i>, AND “names” the graph <i>graphname</i>, so that the graph can be referred to in later commands. (Works analogously for <b>ListPlot</b> command.)</p>	<pre>In[7]:= SquarePlot = Plot[x<sup>2</sup>, {x, 0, 2}]</pre> 
<p><b>Displaying Several Plots on Same Axes</b></p> <p><b>Show</b>[ list of named graphs ] displays a collection of previously generated and named graphs on the same grid.</p>	<pre>In[9]:= Show[SquarePlot, SquareRootPlot]</pre> 

Topic	Examples
<p><b>Options for both ListPlot and Plot commands</b></p> <ul style="list-style-type: none"> <li>• <b>AxesLabel</b> -&gt; {"x -label" , "y -label"} labels the axes of the graph with <i>x</i>- label and <i>y</i>-label.</li> <li>• <b>PlotLabel</b> -&gt; " Plot Title" places the title <i>PlotTitle</i> at the top of the graph.</li> <li>• <b>AxesOrigin</b> -&gt; { <i>xValue</i>, <i>yValue</i> } specifies that axes drawn should cross at point (<i>xValue</i>, <i>yValue</i>).</li> <li>• <b>PlotStyle</b> -&gt; <b>RGBColor</b> [<i>redValue</i>, <i>greenValue</i>, <i>blueValue</i>] specifies that plot should be drawn in color given by <i>redValue</i>, <i>greenValue</i>, <i>blueValue</i>; these values must all be between 0 and 1.</li> <li>• <b>PlotStyle</b> -&gt; <b>Thickness</b> [<i>number between .01 and 1</i>] specifies that the curve should be graphed with the desired thickness.</li> <li>• <b>PlotRange</b> -&gt; <b>All</b> or <b>PlotRange</b> -&gt; { { <i>x</i><sub>1</sub>, <i>x</i><sub>2</sub> } , { <i>y</i><sub>1</sub> , <i>y</i><sub>2</sub> } } defines the range of the plot.</li> <li>• <b>PlotStyle</b> -&gt; {<i>option 1</i>, <i>option 2</i>, <i>etc.</i>} can be used when you want to invoke more than one PlotStyle option.</li> </ul>	<pre>In[14]:= Plot[x<sup>2</sup>, {x, 0, 2}, AxesLabel -&gt; {"x", "y"}, PlotLabel -&gt; "My Graph", PlotStyle -&gt; {RGBColor[1, 0, 0], Thickness[.015]}]</pre> 

Topic	Examples
<p><b>Options used only with ListPlot command</b></p> <ul style="list-style-type: none"> <li>• <b>Plot Joined</b> -&gt; <b>True</b> connects the plotted points.</li> <li>• <b>PlotStyle</b> -&gt; <b>PointSize</b> [ <i>sizeValue</i> ] specifies that points are to be drawn as circular regions with a radius of <i>sizeValue</i>; radius given as a fraction of the total width of the graph.</li> </ul>	<pre>In[18]:= ListPlot[LineData, PlotStyle -&gt; PointSize[.02]]</pre>  <pre>In[20]:= RawData = {{1, 1}, {4, 3}, {2, 1}, {3, 3}}; ListPlot[RawData, PlotJoined -&gt; True]</pre> 
<p><b>Getting Help</b></p> <ul style="list-style-type: none"> <li>• ?CommandName gives a description of the command, commandName, along with syntax.</li> <li>• Highlight a command, then pull down Help Menu and choose Find in Help... -this gives a description of the command along with syntax.</li> </ul>	<pre>In[5]:= ? Plot</pre> <p>Plot[f, {x, xmin, xmax}] generates a plot of f as a function of x from xmin to xmax.</p> <p>Plot[{f1, f2, ... }, {x, xmin, xmax}] plots several functions fi. <a href="#">More...</a></p>