Graph the function \( y = 3 ( ( x + .5 )^3 - ( x + .5 )^2 ) + .375 \) in the following viewing window: \( \text{ZDECM} \) followed by \( \text{ZIN} \) on \((0, 0)\). Exit back to the GRAPH screen menu and choose \textbf{MATH} from the screen menu. From the new screen menu choose \textbf{DIST}. Observe that the cursor is at the center of the graph \((0, 0)\) in this case. The TRACE feature has been automatically activated, so the \textit{lt/rt arrow} moves you around the graph. With the cursor at \((0, 0)\) press \textbf{ENTER}. This has the effect of setting one end of a chord. Now move the cursor along the graph to the right, going all the way to \((.6, .738)\). Observe the TI drawing the chord from \((0, 0)\), the first cursor position, to each position as the cursor moves along the graph.

Since the initial end of each chord is at \((0, 0)\), the slope of each chord is just given by \( y/x \). For example the slope of the chord from \((0, 0)\) to the point \((.6, .738)\) is 1.23. For each value of \(x\) record the corresponding value for \(y\) and the slope of the chord from \((0, 0)\) to \((x, y)\) in the following table.

<table>
<thead>
<tr>
<th>(x)</th>
<th>(y)</th>
<th>slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>.6</td>
<td></td>
<td></td>
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<tr>
<td>.5</td>
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<td>.4</td>
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<td>.3</td>
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<td>.25</td>
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<td>.2</td>
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<td>.15</td>
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<td>.1</td>
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<td>.075</td>
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<td>.05</td>
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<tr>
<td>.025</td>
<td></td>
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<tr>
<td>0</td>
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<tr>
<td>-.025</td>
<td></td>
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<tr>
<td>-.05</td>
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<td></td>
</tr>
<tr>
<td>-.075</td>
<td></td>
<td></td>
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<tr>
<td>-.1</td>
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</tr>
</tbody>
</table>
With the cursor back at ( 0 , 0 ) choose TANLN (still in MATH screen menu) and ENTER. The TI draws the tangent line and displays its’ slope in the lower left corner of the screen. What is the slope of this tangent line through ( 0 , 0 )? ________ How does it compare to the slopes near ( 0 , 0 ) of the chords in the above table? ________________

To draw the tangent lines at other points again choose TANLN, move the cursor to the desired point on the graph and press ENTER. What is the slope of the tangent line at x = -.5 ? ________

In your own words describe how the point on the graph were x = -.5 is related to the rest of the graph; in other words, what is special about this point? ________________________________________________________________

Thinking of the graph as a hill to be climbed from left to right, how would you describe the change in the hill that takes place from one side of x = -.5 to the other? ________________________________

There is another point on this graph where it looks like the tangent line should have slope 0, where? ________ What’s special about this other point? ________________________________

How would you describe the change that takes place in the hill on either side of this point? ________

Try drawing the tangent line at this point. What do you observe? ________________________________

Sketch the graph of y = ( x - 1 )^3 + 1 in the ZDECM viewing window. There is a point on this graph where it looks like the tangent line should have slope 0, where? ________ Draw the tangent line at this point. What do you observe? ________________________________

What’s special about this point? __________________________________________________________

Thinking of this graph as a hill, how would you describe the change that takes place on either side of this point? __________________________________________________________

These examples are intended to exhibit the three types of phenomena that can occur at points on a graph where the tangent line has slope 0. They are local maximum, local minimum, & inflection.