Definition: Parametric Curve, Parametric Equations
The graph of the ordered pairs \( x, y \) where \( x = f(t) \) and \( y = g(t) \) are functions defined on an interval \( I \) of \( t \)-values is a parametric curve. The equations are parametric equations for the curve, the variable \( t \) is a parameter, and \( I \) is the parameter interval.

Example 1: BY HAND.
\[ x(t) = 2 - t \quad \text{AND} \quad y(t) = 2t \]
Fill in the table of values.

<table>
<thead>
<tr>
<th>( t )</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( y )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Using the chart above, the domain for “\( t \)” consists of the integers –3 through 3. Therefore, our graph consists of ____________________________.
If we change the domain of “\( t \)” to \([-3, 3]\) (the real numbers between –3 and 3), the graph becomes ______________________ with endpoints ____________ and ____________.
The domain of the curve is ____________. The range of the curve is ____________.
If you eliminate “\( t \)”, what would the equation become?

Is this a function? ______________ Why or why not? _____________________

Example 2: BY CALCULATOR (same equations).
1. Go to “MODE” and change to parametric mode - “PAR”
2. Go to “y=” and put in \( x(t) \) and \( y(t) \).
3. Go to WINDOW and looking at your chart above, let’s set our window.
   - \( T \min = _____ \quad T \max = _____ \quad T \step = _____ \)
   - \( X \min = _____ \quad X \max = _____ \quad X \step = _____ \)
   - \( Y \min = _____ \quad Y \max = _____ \quad Y \step = _____ \)
4. Now graph and check your graph against the calculator graph.
5. Check your table above against the calculator table.
Graphing Parametric Equations BY HAND and USING THE CALCULATOR

Example 3: For the given parameter interval, graph the parametric equations.

\[ x = t^2 - 2 \quad \text{AND} \quad y = 3t \]

a. \(-3 \leq t \leq 1\

<table>
<thead>
<tr>
<th>t</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the parametric equations in the above example, eliminate the parameter. What would the equation become?