

# Study Guides

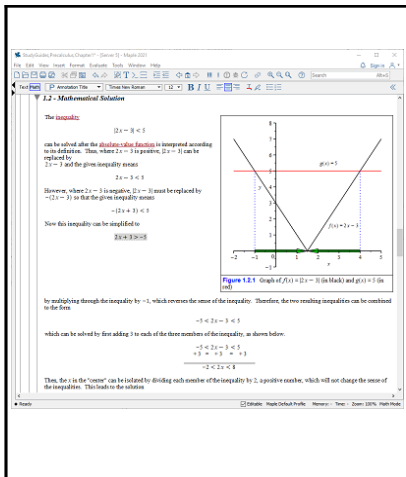
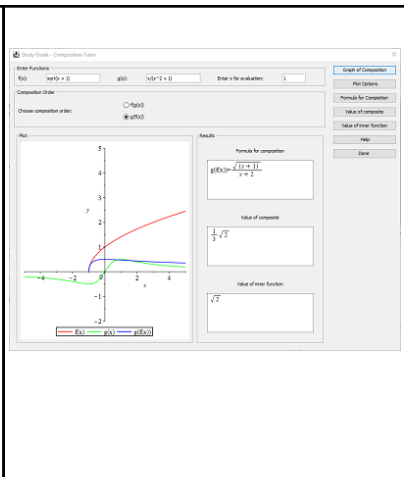
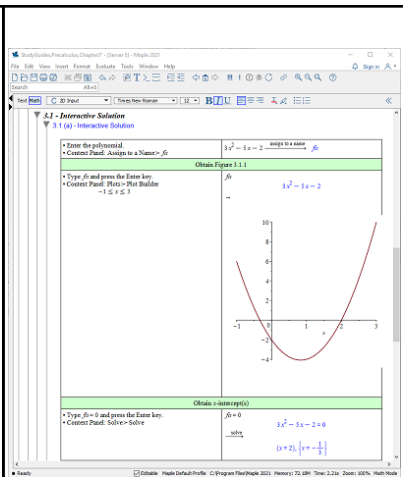
The Clickable Calculus Study Guides for Precalculus, Calculus, and Multivariate Calculus are now available directly in Maple.

Maple study guides are interactive Maple e-books in core math subjects. Each study guide covers fundamental concepts through visualization, practice problems, and theory. Learn from hundreds of worked problems, and then apply these same Clickable Math tools to check your own homework and get extra practice.

Explore these guides:

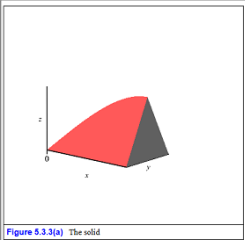
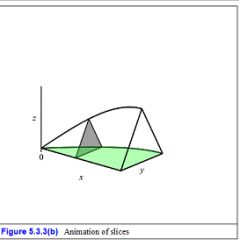
## [Precalculus Study Guide](#)

- Provides a focused review of precalculus
- Covers 11 key topics
- Each problem is solved four ways: a mathematical solution (that is, solve as you'd see in a textbook), using an interactive Maplet, using clickable techniques, and using Maple commands.

		
Mathematical solution	Maplet solution	Interactive solution

## Calculus Study Guide

- Comprehensive coverage of both differential and integral calculus
- Supplements your textbook with explanations, plots, and animations
- Use Maple to work through example problems.

<p><b>Chapter 5: Applications of Integration</b></p> <p><b>Section 5.3: Volume by Slicing</b></p> <p><b>Example 5.3.3</b></p> <p>By the method of slicing, obtain the volume of the solid whose base in the <math>xy</math>-plane is the region bounded by the <math>x</math>-axis, and the curves <math>y = \sin(x)</math> and <math>x = \pi/2</math>, and whose cross sections parallel to the <math>yz</math>-plane are equilateral triangles.</p> <p><b>Solution</b></p> <p><b>Mathematical Solution</b></p> <p>Figure 5.3.3(a) contains an image of the solid. Figure 5.3.3(b) animates the slices.</p> <div style="display: flex; justify-content: space-around;">   </div> <p>Figure 5.3.3(a) The solid</p> <p>Figure 5.3.3(b) Animation of slices</p>	<p style="text-align: center;">Differentiate <math>f(x) = e^{\sqrt{x}}</math>.</p> <p><b>Solution</b></p> <p>The Chain rule must be applied. The derivative of an exponential is again that exponential, times the derivative of the exponent. This can be seen by invoking the <a href="#">Differentiation Methods</a> tutor, or by studying the annotated stepwise solution in Table 2.6.1(a), whose content is obtained with the All Solution Steps option in the Context Panel. The Context Panel also gives access to the Differentiation Rules that also appear in the Differentiation Methods tutor.</p> <p>Tools-&gt;Load Package: Student Calculus 1    Loading <a href="#">Student-Calculus1</a></p> <p>Expression palette: Differentiation template</p> <p>Context Panel: Student Calculus1&gt;All Solution Steps</p> <p>Differentiation Steps</p> <p><math>\frac{d}{dx} e^{\sqrt{x}}</math></p> <ul style="list-style-type: none"> <li>1. Apply the <b>chain rule</b> to the term <math>e^{\sqrt{x}}</math></li> <li>Recall the definition of the <b>chain rule</b></li> </ul> $\frac{d}{dx} f(g(x)) = f'(g(x)) \frac{d}{dx} g(x)$ <ul style="list-style-type: none"> <li>Outside function</li> <li><math>f(v) = e^v</math></li> <li>Inside function</li> <li><math>g(x) = \sqrt{x}</math></li> <li>Derivative of outside function</li> <li><math>\frac{d}{dv} f(v) = e^v</math></li> <li>Apply composition</li> <li><math>f'(g(x)) = e^{\sqrt{x}}</math></li> <li>Derivative of inside function</li> <li><math>\frac{d}{dx} g(x) = \frac{1}{2\sqrt{x}}</math></li> <li>Put it all together</li> <li><math>\frac{d}{dx} f(g(x)) = \frac{d}{dx} g(x) = e^{\sqrt{x}} \left( \frac{1}{2\sqrt{x}} \right)</math></li> </ul> <p>This gives:</p> $\frac{e^{\sqrt{x}}}{2\sqrt{x}}$
<p>Plot and animations enhance lessons.</p>	<p>Step-by-step solutions</p>

## Multivariate Calculus Study Guide

- Visits all topics from a standard multivariate calculus course
- Focus on understanding new ideas and gaining a deep understanding
- Problems worked in various methods, including a mathematical solution, an interactive Maple solution, and a coded Maple solution

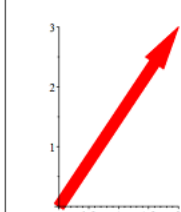
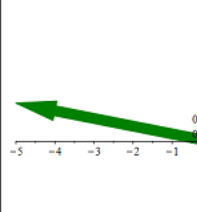
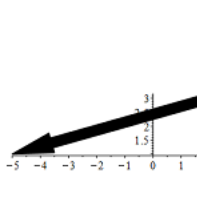
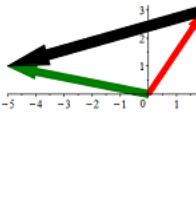
**Solution**

▶ *Mathematical Solution*

▶ *Maple Solution - Interactive*

Enter the data	
<ul style="list-style-type: none"> <li>• Enter position vector as per Table 1.1.1.</li> <li>• Context Panel: Assign to a Name&gt; P</li> </ul>	(2, 3) → assign to a name → P
<ul style="list-style-type: none"> <li>• Enter position vector as per Table 1.1.1.</li> <li>• Context Panel: Assign to a Name&gt; Q</li> </ul>	(-5, 1) → assign to a name → Q
Obtain PQ	
<ul style="list-style-type: none"> <li>• Write the difference of position vectors Q and P.</li> <li>• Context Panel: Evaluate and Display Inline</li> </ul>	$Q - P = \begin{bmatrix} -7 \\ -2 \end{bmatrix}$

Obtaining Figure 1.2.9(a) interactively isn't that difficult. The three main arrows are drawn separately, their colors changed via the Context Panel, and combined via drag-and-drop. Consequently, re-executing this whole document will cause the vectors shown below in red and green to be rendered in black.

<ul style="list-style-type: none"> <li>• Type P, Q, and Q - P, as appropriate, and press the Enter key</li> <li>• Context Panel: Plots&gt; Arrow from origin (for P and Q)</li> <li>Context Panel: Plots&gt; Arrow from point (for Q - P)&gt; 2, 3</li> </ul>	<ul style="list-style-type: none"> <li>• Copy/paste each arrow:</li> <li>Select arrow</li> <li>• Context Panel: Color</li> </ul>
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>P</b></p> <math>\begin{bmatrix} 2 \\ 3 \end{bmatrix}</math>   </div> <div style="text-align: center;"> <p><b>Q</b></p> <math>\begin{bmatrix} -5 \\ 1 \end{bmatrix}</math>   </div> <div style="text-align: center;"> <p><b>Q - P</b></p> <math>\begin{bmatrix} -7 \\ -2 \end{bmatrix}</math>   </div> <div style="text-align: center;">  </div> </div>	

▶ *Maple Solution - Coded*

The following sequence of commands will draw the principal vectors in Figure 1.2.9(a). The [RootedVector](#) command creates a vector whose "tail" or root is part of the data structure. The [PlotVector](#) command makes provision for assigning arbitrary colors to individual vectors.

```

P := (2, 3) :
Q := (-5, 1) :
PQ := VectorCalculus:-RootedVector(root = [2, 3], Q-P) :
VectorCalculus:-PlotVector([P, Q, PQ], color = [red, green, black], width = 2, scaling = constrained)
    
```

The same problem shown using interactive steps and using Maple commands.