

Build and Share Interactive Content

Maple 2023 provides additional tools for creating documents and interactive applications programmatically. These tools can be used to develop [Maple Learn](#) content or to create applications to be used in Maple. Maple Learn is an online environment designed specifically for teaching and learning mathematics.

[Canvas-based Quizzes](#)

[Canvas Scripting](#)

Canvas-based Quizzes

A new [QuizBuilder](#) command comes loaded with sample quizzes and makes it easy to create your own custom quiz questions

Grading:-QuizBuilder();

Plot Multiple-Choice Ra

Which is a plot of $\${FUNC}$?Question
type:

Multiple Choice ▾

1 1:

Check ...

 Keep re...

Try An...

```

1  proc()
2      randomize();
3      local A := [sin(x),cos(x),tan(x)][rand(1..3)()];
4      ~~~~~ Grading:-Quiz:-Set(`$FUNC`=A);
5      [plot(A),plot(-A),plot(Pi*A,x=-2*Pi..2*Pi)]:
6  end proc:

```

1

Show ...

Hint

1

Common
Code

1

Samples

Choose
Sample:

Plot Multiple-Choice Randomized ▾



Click to Publish to Maple Learn



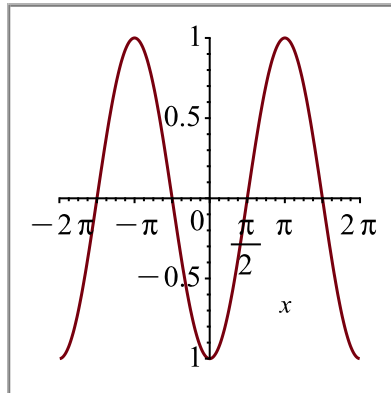
Click to Create Question in New Maple Document



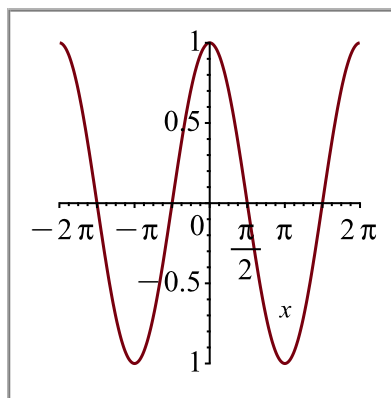
Click to Preview Question Inline ...

Plot Multiple-Choice
Randomized

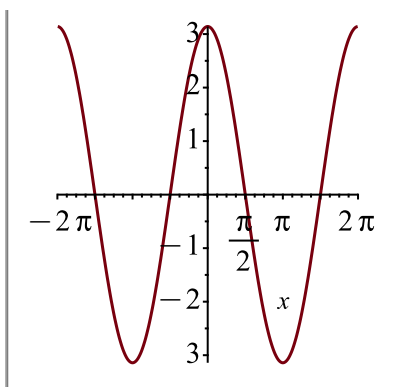
Which is a plot of $\cos(x)$?



Check Answer



Try Another



Multiline Feedback for Free-Response Quiz Questions

The [Quiz](#) command now supports multi-line free-response answers, with the **style=multiline** option, where students must fill in all of the steps required to get to the final answer. Each step is assessed for correctness.

Additionally, The Quiz command has options for **hints** and **titles**.

The following example can be found in the [QuizBuilder](#) as one of the samples:

```

1 Grading:-Quiz(
2   "Integrate:",
3   proc ()
4     SolveFeedback(_passed,('calculus') = 1);
5   end proc,
6   proc ()
7     Int(rand(2 .. 4)()*('x')^rand(2 .. 4()),'x');
8   end proc,
9   solution = proc () local integral;
10    integral := Grading:-Quiz:-Get(`$START`);
11    Student:-Calculus1:-ShowSolution(integral,('output') = ('record')
12  );
13  end proc,
14  gradeisindex = true,
15  title = "Integration Multiline Feedback",
16  style = multiline,
17  inertform = true
18 );

```

Integration Multiline Feedback

Integrate:

$$\int 3 \cdot x^3 dx$$

Check Answer

Try Another

-- Begin Answer Here

Show Solution

> New Math Entry Box

Canvas Scripting

Maple 2023 greatly extends the tools for creating Canvas-based documents and interactive applications programmatically.

The [Canvas](#) package provides a framework for Maple users to easily build applications that can be used both in Maple and also shared on the web through Maple Learn. These applications can gather user input and compute using standard Maple commands in either environment.

Canvas Package

The [DocumentTools:-Canvas](#) package builds on [DocumentTools](#) component primitives to provide a simple way to generate a grid layout of text and math. It provides an easy mechanism to programmatically generate a page of math text and other elements. Maple 2023 includes more tools and customizations to help you create content using the Canvas package.

Canvas Example Gallery

A new gallery offers extensive examples that use Canvas Scripting to create different types of interactive content in Maple that can then be shared on the web via Maple Learn.






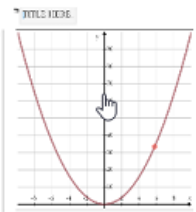

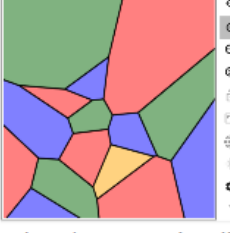
Interactive applications can be completely programmatically constructed as content; the Canvas example gallery compiles a list of templates to make it easier to create some of the more complex applications.

With over 44 templates and modifiable examples covering topics such as functions, geometry, calculus and more, applications can be developed and tested in Maple and deployed online via Maple Learn.

The gallery includes application containing a wide variety of features such as clickable plots, interactive visualizations, quizzes that offer students unlimited practice and provide feedback, examples that provide solution steps, and more. The Maple code used for those applications can be easily viewed, modified, and copied, so users can customize specific applications or use the code as a starting point for their own work.

Those applications can be incorporated into any learning environment, such as classroom demonstrations with interactive plotting or independent studying with quizzing allowing students to practice a specific topic at home.

Visit the gallery: [Maple Learn Scripting Templates](#)

 <p>Graphing</p>  <p>Visualization</p>  <p>Quiz</p>  <p>Options and Add-ons</p> <p>Graphing</p> <p>Basic Templates</p>  <p>Interactive Clickable Plots</p>  <p>Clickable Plots</p>	 <p>Hamiltonian Paths Quiz</p>  <p>Four Color Theorem Visualization</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

More Options

Canvas elements have more options to control things like font size, color, slider controls and custom attributes. New [Script](#) commands make it easier to clear a single group (see [ClearGroup](#)), or reset the entire document (see [Commands/RESET](#)), or convert text with embedded MathML into plain-text (using option `textconvert=true` from [GetElements](#)).

In the following example, `color` and `textcolor` are used for the buttons, and `fontsize` is used to distinguish the title from the other text. These are all new options.

```
1 with(DocumentTools:-Canvas):
2 Calc := proc( canvas, Op )
3     local data := GetMath(canvas,"data")[1]:-math;
4     local sc := Script();
5     SetActive(sc,"mean");
6     SetMath(sc,Statistics:-Mean(data));
7     SetActive(sc,"median");
8     SetMath(sc,Statistics:-Median(data));
9     local p := GetElements(canvas,"plot")[1];
10    SetActive(sc,p);
11    local x,i;
12    SetPlot(sc,plots:-display( {
13        plot( Statistics:-Median(data),x=1..numelems(data),color=
14            "darkred"),
15        plot( Statistics:-Mean(data),x=1..numelems(data),color=
16            "darkblue"),
17        plots:-textplot( [ seq([i,data[i],data[i]],i=1..numelems(
18            data))] ,axes=none )
19        }));
20    ToString(sc);
21 end proc:
22 cv := NewCanvas([Text("Mean vs. Median",fontsize=26),
23     "Modify the data, then click the button to calculate the statistics and
24     see the plot. "
25     "What happens if you add a really big or really small value?")
26     Math([9,5,2,3,3,6,4,10],custom="data"),
27     Math("",custom="mean"),
28     Math("",custom="median"),
29     StaticPlot(custom="plot"),
30     ScriptButton("Mean",Calc,parameters=["mean"],color="darkblue",
31     textcolor="white",size=[100,22],position=[300,230]),
32     ScriptButton("Median",Calc,parameters=["median"],color="darkred",
33     textcolor="white",size=[100,22],position=[300,280])
34 ]):
```

Mean vs. Median

Modify the data, then click the button to calculate the statistics and see the plot. What happens if you add a really big or really small value?

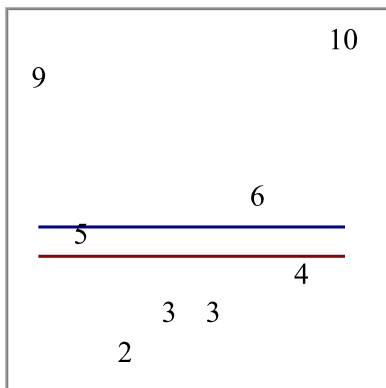
[9, 5, 2, 3, 3, 6, 4, 10]

Mean

5.2500000000000000

Median

4.5000000000000000



To try this on the web using [Maple Learn](#), execute the following and then follow the hyperlink.

> **ShareCanvas(cv)**

<https://learn.maplesoft.com/#/?d=EHFOIGJKGROMMILGKOLOPIMNMOCFASEFALINDMHJIUBUGRJJJKBTJRDKLIHANCPGREOHGDTILKLIPFLNTDFIMHPHUMHHPJLPKHJ>