Introduction to Maple

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Maple is a (C)omputer (A)lgebra (S)ystem (or CAS).

- Performs symbolic computations (like factoring, differentiating, etc)
- Can do computations exactly (using fractions, exponentials, trig functions, etc).
- Is a great way to visualize two and three dimensional graphs.

To put Maple on your home computer

- Go to the following website:

  `http://math.whitman.edu/Maple-17/`

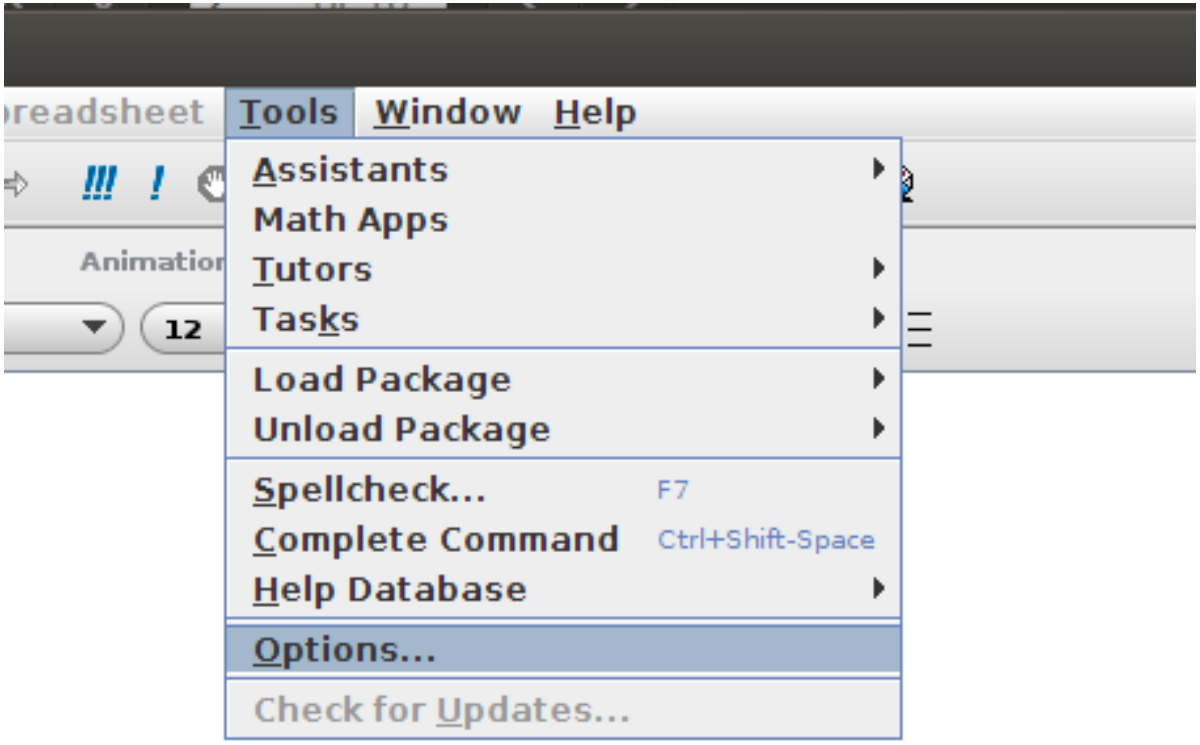
- Read the `README` file carefully!!
  Be sure you check the **network installation** (not checked by default)
- If you open Maple and it asks you to put in a passcode, you've installed it incorrectly!

When you open Maple for the first time:

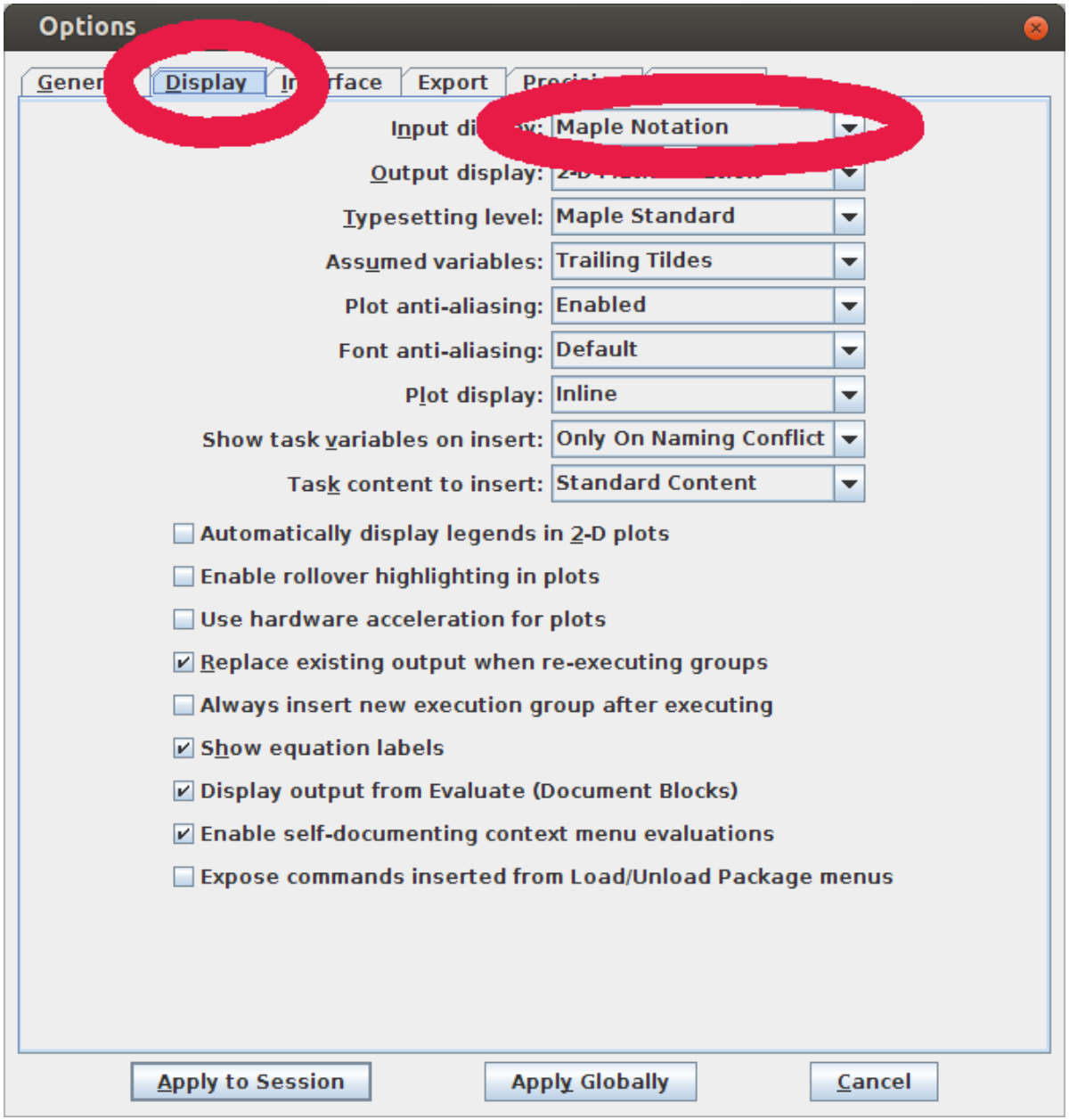
Choose "Worksheet Mode" (not the default, but it soon will be).

Setting up Maple

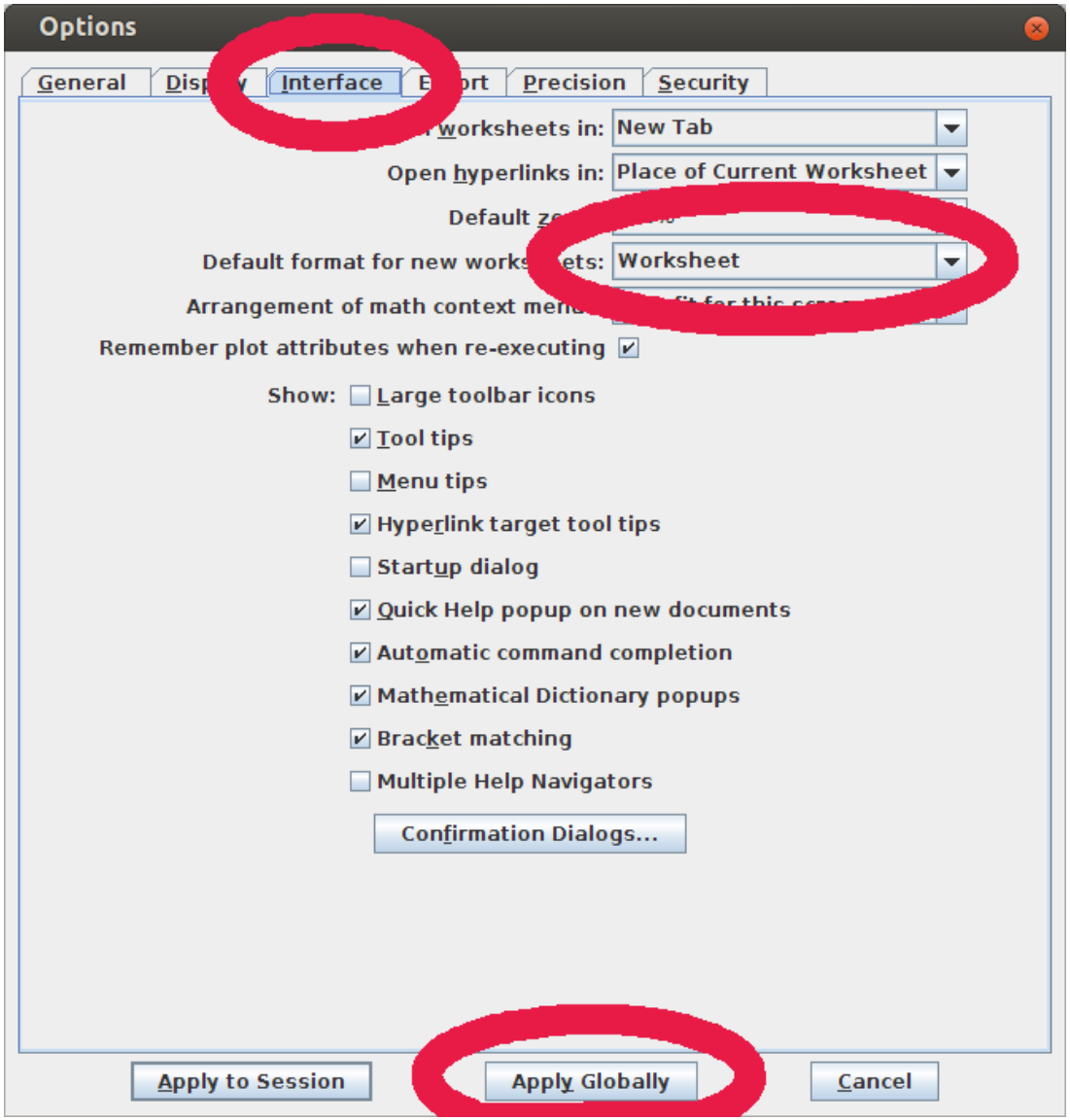
Go to TOOLS, then OPTIONS



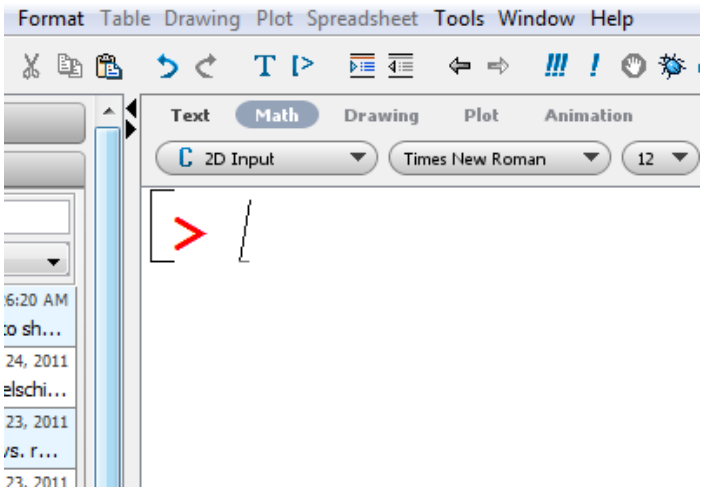
Go to DISPLAY, then
change INPUT DISPLAY to MAPLE NOTATION:

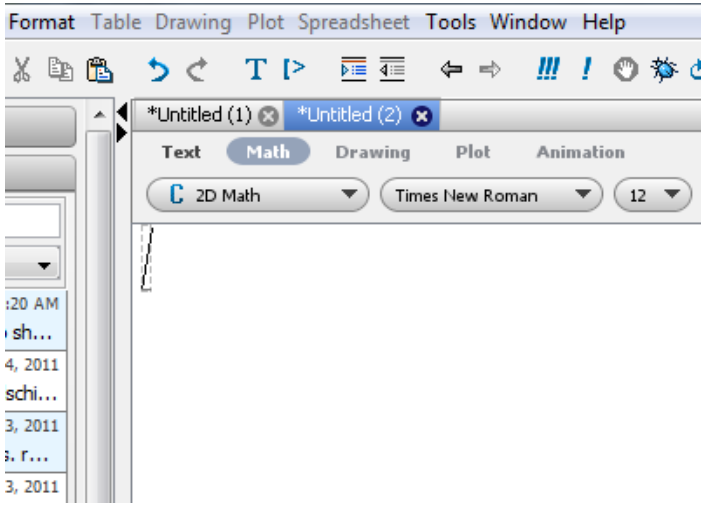


Go to INTERFACE tab
Change "Default format for new worksheets" to WORKSHEET
Select APPLY GLOBALLY



Take a moment to close/re-open Maple for a check:
You should have a red prompt (like image to the left), the image to the right is incorrect (Document style).





General Comments about Maple

1. Use `ctrl`-n to control font size.
2. Save early and save often! Maple has been known to freeze at unfortunate times!
3. Feel free to explore the interface, and especially the tools at the top.

Computations in Maple

Standard operators, with `*`, `^`, and `exp()` for multiplication, exponentiation, and the exponential function.
Examples (See the tutorial):

```
2/5;
2^5;
exp(2);          # This is e^2
(1+3*I)*(1-I);  # Complex Numbers
ifactor(60);
evalf(Pi);
evalf(pi);
```

Assignments and Expression

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  What happens: `6:=a`
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  Solve $E = mc^2$ for the variable m:

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  Solve $E = mc^2$ for the variable m: `solve(G,m);`
- Expand expression stored in F: `expand(F);`
- Clear the variables F and G:
  `F:='F';  G:='G'`

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SOLUTION:

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f:=a*(x+3)^2;
subs({a=3,x=1},f);
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Example: If $x = z^2$, substitute in f, store the result in f2:

```
f2:=subs(x=z^2,f);
```

Check what the variables are: `f, a, x, f2`

Functions versus Assignments

Functions take inputs and create outputs. Assignments store expressions in variables. Here's an example of the difference:

```
f:=x^2-3*x+5;
f(1);              #Maple will not understand this
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g(1);
(g(x+h)-g(x))/h;
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g:=x->x^2-3*x+5;
g(1);
(g(x+h)-g(x))/h;
```

How to make a function from an expression: `unapply`

```
h:=unapply(f,x);
h(3);
```

Some commands will only operate on *functions*, some only work with *expressions*, some will work with both, but how you call the operation may change.
Clear out the workspace, and we'll do create some plots.

```
restart;
f:=x^2+4*x-2;     #f is an expression
g:=x->sin(x)+x;   #g is a function
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plot(f,x=-8..8);     #This is OK
plot(g,x=-8..8);     #This is an error
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plot(g(x),x=-8..8); #This is OK
plot(g, -8..8);      #This is OK
plot(f, -8..8);      #This is an error
```

Hint: Always use one form or the other (Probably easier to use the expression).

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plot({f,g(x)},x=-8..8,y=-5..8);
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You can plot *parametric equations*!

```
plot([sin(t),cos(3*t),t=0..2*Pi]);  #Brackets include t
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You can plot *parametric equations*!

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plot([sin(t),cos(3*t),t=0..2*Pi]);  #Brackets include t
```
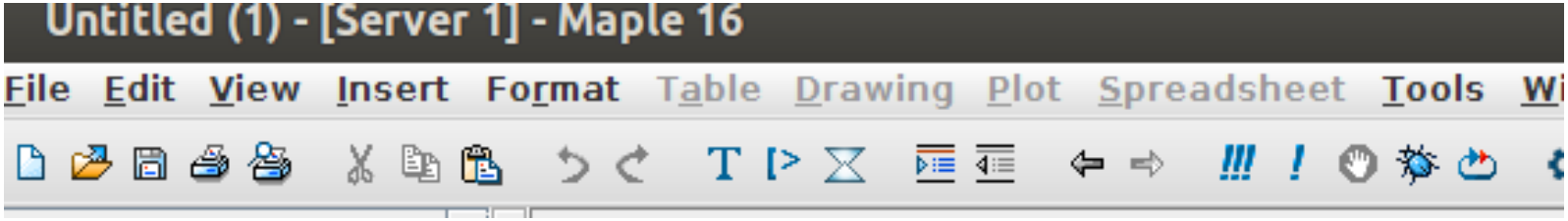

You can plot in polar coordinates as well!

```
plot([sin(t),cos(3*t),t=0..2*Pi],coords=polar);
```

Buttons on the top toolbar

Some of the important buttons:



- The usual copy/paste keys.
- `T` is for text. Go to a prompt, and insert some text.
- To get a new "execution group", use the `[>` key...
  Or: `Insert->Execution Group`
- The stop sign: Try to stop the computation.
- A debugger (we won't typically use this)
- Restart

- Note on turning Maple Worksheets in:
  - Go to `Edit->Remove Output->From Worksheet`
  - Save the worksheet.
  - Exit Maple.
  - Open Maple back up, and find the worksheet.
  - To execute all commands, use the !!! button.

Sources for help and more information:

- Go to: `Tools`, then *Assistants*, *Tutors* or *Tasks*
  Helpful: Take some time to browse through these!
- Help on a certain command: `?command` (like `?plot`)
- General help: There is a lot of stuff on the web, and a lot is accessible from the *Help* option at the top of the page.