A Brief Maple 12 Cheat Sheet

- There are two different interfaces for Maple. I think it's clearest to use the Document Mode.

  Probably the easiest way to do this is to go to **File** – **New** – **Document Mode**.

- The palettes on the left can be very handy for providing templates for Maple's syntax. In particular, the **Expression** and **Common Symbols** palettes will be especially useful for Calculus.

- You may eventually find that it is easier to enter some expressions on the keyboard rather than use the palettes. A few handy ones are:

  `Pi` for π
  `exp(x)` for e^x
  `sqrt(x)` for $\sqrt{x}$

  Be aware that Maple is case-sensitive: `pi` is *not* the same thing as `Pi`.

- The contextual menus provide access to many of the functions of Maple. If you right-click on an expression, Maple will give you the options to:

  Differentiate, Integrate, 2-D Plot, 3-D Plot, Evaluate at a point, Approximate, and many others

  Explore!

- You can access the Maple commands for numeric integration by:
  - **Tools** – **Load Package** – **Student Calculus 1** will load the package
  - `RiemannSum( )` is the Maple function that will calculate, or plot, the approximation. For example,

    ```
    RiemannSum( cos(x^2), x=0..2 Pi, partition=30, method=left, output=sum)
    ```

    will output L_{30} for $\displaystyle\int_0^{2\pi} \cos(x^2)\,dx$. You can then right-click on the output and select **Approximate** to find the numeric value.
  - The other options we will use for `method` are `right` and `midpoint`
    The other options we will use for `output` are `plot` and `animation`

- The **Help** menu is your friend. Use it to find the exact syntax and options for the commands.

  The **Help** – **Quick Reference** option is also worth exploring.

Basic Plots – Be sure to check the options for these commands

`plot(sin(x), x=-2..Pi)`	Plots $\sin(x)$ for $-2 \le x \le \pi$
`plot([x^2, sin(x)], x=-2..Pi)`	Plots the two functions x^2 and $\sin(x)$ for $-2 \le x \le \pi$ on the same set of axes
`plot([cos(t), sin(t), t=0..Pi])`	Plots the parametric curve $(\cos(t), \sin(t))$ for $0 \le t \le \pi$ Notice that t is *inside* the square braces.
`plot3d( sin(x)*cos(y), x=-3..3, y=0..5);`	A 3-D plot of $z = \sin(x)\cos(y)$. You can also use the options `coords=cylindrical` and `coords=spherical` to plot in other coordinate systems.

The Plots Package – Load using **Tools – Load Package – Plots**

`polarplot(sin(2*theta), theta=0..2*Pi)`	
`contourplot( x^2-y^2, x=-5..5, y=-5..5)`	You might want to use the `filled=true` and/or `coloring=[blue,red]` options.
`densityplot(x^2-y^2, x=-5..5, y=-5..5)`	I often like to sue the options `colorstyle=HUE`, `style=PATCHNOGRID`, and `grid=[100,100]`, although you'll want to be careful with how large you make the grid.
`fieldplot([x-y,2*x], x=-5..5, y=-5..5)`	The `grid=[10,10]` option will determine how many vectors are graphed.
`gradplot(x^2-y^2, x=-5..5, y=-5..5)`	
`spacecurve([sin(t),cos(t),t], t=0..20)`	Plots a parametric curve in 3-D
`implicitplot( x^2/4 + y^2=1, x=-5..5, y=-2..2)`	A 2-D implicit plot. Notice that you must give bounds for both x and y
`implicitplot3d( x^2/4 + y^2+z^2/9=1, x=-2..2, y=-1..1, z=-3..3)`	A 3-D implicit plot
`p1:=plot3d(12-x^2-y^2, x=-3..3, y=-3..3)`	
`p2:=plot3d(x+y+3,x=-3..3,y=-3..3)`	
`display(p1,p2)`	Allows you to display multiple plot structures on the same set of axes.

The LinearAlgebra Package – Load using **Tools – Load Package – Linear Algebra**

```
DotProduct(<1,2,3>,<4,5,6>)

CrossProduct(<1,2,3>,<4,5,6>)
```