

New Maple Commands: Week 3

This week we look at Riemann sums to give us something to discuss and figures to include in our LaTeX document. We also look at some plotting options.

- **RiemannSum** Look this up in the Maple help file. When using it, be sure to include the following line before using the function:

```
with(Student[Calculus1]):
```

- **Integration:** In Maple, the general form for an integral is:

$$\int_a^b f(x) dx \quad \Leftrightarrow \quad \text{int}(f, x=a..b);$$

where (in Maple) f is an **expression** in x . If we do not want Maple to try to determine an antiderivative, we can use the “inert” form of the integral (**Int**). For example, compare the results:

```
F:=exp(-t^2);
G1:=int(F,t=-1..2);
G2:=Int(F,t=-1..2);
evalf(G2);
```

- Extra options in a plot:
 - We can change the way the tick-marks are set. Here’s an example:
Plot $y = \sin(x)$ for x between -10 and 10 . Use 6 tickmarks on the x -axis and 10 tickmarks on the y -axis:

```
plot(sin(x),x=-10..10,tickmarks=[6,10]);
```
 - We can label the tickmarks any way we want. Here’s an example:
Plot $y = \sin(x)$, for x between -6 and 6 . Label the x -axis for each maximum as A, B, C , etc. The line break is for readability. In this case, we use the default markings for the y -axis.

```
plot(sin(x),x=-6..6,tickmarks=[[-3*Pi/2="A", -Pi/2="B", Pi/2="C",
3*Pi/2="D"],default]);
```
 - We can include a legend on the plot- We should do that if we have more than one function. We can also label the axes and change the colors of the functions.
Example: Plot $\cos(5x)$ and $\sin(x)$ using red and blue respectively, change the viewing window to $0 \leq x \leq 3\pi$ and $-3 \leq y \leq 2$, label the axes as “Axis 1”, “Axis 2” (respectively), and make the legend read “Function 1” and “Function 2”. The tickmarks are a little squeezed together. We can respace them with the command below. The line breaks are for readability only (not needed in Maple).

```
plot([cos(5*x),sin(x)],x=0..3*Pi,view=[0..3*Pi,-3..5],
      legend=["Function 1","Function 2"],
      labels=["Axis 1","Axis 2"],
      color=[red,blue],
      tickmarks=[spacing(Pi),default]);
```

New Writing and LaTeX Discussion

In writing up the solution to the lab questions, use section and subsection (and if needed subsubsection) headings. You should label any figures used, and reference them in the text (See the handouts from Week 2).

When typesetting mathematics, keep in mind whether or not the expression should be “inline” or “display math” mode.