Common Maple Tasks

Below are some common things we want to do in Maple- For example, how to define expressions and functions, and how to plot these in Maple.

1. To download and run a worksheet from the web: Use the **right** mouse button on the link, and choose: `Save link target as...` In Maple, open the file as you would normally do in a Windows program.

2. Be sure to save your worksheet often! You might have a problem where Maple locks up- if you haven't saved your worksheet, you could lose all your work!

3. Plot the function $y = \mathrm{e}^{-3x} \sin(2\pi x)$ over the interval $-1 \leq x \leq 4$. Adjust the window size so that $-2 \leq y \leq 2$. The Maple commands:

```
f:=exp(-3*x)*sin(2*Pi*x);
plot(f,x=-1..4);
plot(f,x=-1..4,y=-2..2);
```

Notes:

- The notation `:=` is an "assignment" operator. In this case, we are assigning the expression to the letter f.
- The mathematical function $\mathrm{e}^{f(x)}$ is written in its functional form, $\exp(f(x))$. If you want the number e, use $\exp(1)$
- The constant π in Maple **must** be written with a capital letter P.
- The second plot command is how you can change the viewing window.
- Remember that every line of Maple must end with a semi-colon.

4. Plot the function f above together with $\sin(x)$ on the same axis:

```
f:=exp(-3*x)*sin(2*Pi*x);
g:=sin(x);
plot({f,g},x=-1..4);
```

Note that by clicking the mouse on the graph, you can change some of the aspects of the plot.

5. Miscellaneous Algebra commands:

- Expand the expression: $(x - 2)(x - 3)$: `expand((x-2)*(x-3));`
- Factor the polynomial: $x^3 - 7x + 6$: `factor(x^3-7*x6)+`
- Write the fraction $\frac{x^2}{x+1}$ in partial fraction form:

  `convert( x^2/(x+1), parfrac, x);`
- Solve the equation $x^2 - 3x + 5 = 0$ for x:

```
solve(x^2-3*x+5=0,x);
```

- Solve the system of equations $3a + 2b = 0, 2a - 4b = 1$ for a, b

```
solve({3*a+2*b=0, 2*a+4*b=1},{a,b});
```

6. Derivatives:

   - Have Maple compute the first and third derivative of the previously defined expression in f:

   ```
   df:=diff(f,x);
   d3f:=diff(f,x$3);
   ```

   - Have Maple compute $\dfrac{\partial f}{\partial y}$ if $f(x,y) = x^2 y - \sin(xy)$.

   ```
   f:=x^2*y-sin(x*y);
   dfdy:=diff(f,y);
   ```

   - If $x^2 y - \sin(xy) = 3$, have Maple treat y perform implicit differentiation and solve for y':

   ```
   Eqn:=x^2*y(x)-sin(x*y(x))=3;
   Eqn2:=diff(Eqn,x);
   solve(Eqn2, diff(y(x),x));
   ```

7. Integrals: Have Maple compute the integral $\displaystyle\int_a^b f(x)\,dx$. The generic Maple command is:

```
int(f,x=a..b);
```

For example,

- $\displaystyle\int_1^\infty \frac{1}{x^2}\,dx$: `int(1/x^2,x=1..infinity);`

- To get the generic antiderivative: `int(1/x^2,x);`

- We can use the integral as a function: Plot $\displaystyle\int_0^x e^{-t^2}\,dt$ for $-3 \le x \le 3$

```
F:=x->int(exp(-t^2),t=0..x);
plot(F(x),x=-3..3);
```

Note how we define a *function* versus an *expression*. Try evaluating $F(2)$ in Maple- To obtain a numerical approximation, use `evalf(F(2))`