Differential Equations and Maple - Introduction

1. Our first homework problem was to have Maple verify that the given y was a solution to the differential equation:

$$y^{(4)} - 20y''' + 158y'' - 580y' + 841y = 0$$

where $y = xe^{5x}\cos(2x)$. We'll break this into several lines:

```
y:=x*exp(5*x)*cos(2*x);
dy:=diff(y,x);
d2y:=diff(y,x$2);
d3y:=diff(y,x$3);
d4y:=diff(y,x$4);
d4y-20*d3y+158*d2y-580*dy+841*y;
```

2. Maple can solve many differential equations. For example, solve $y'' + 3y' - 2y = 5\sin(2t)$:

```
DE:=diff(y(t),t$2)+3*diff(y(t),t)-2*y(t)=5*sin(2*t);
dsolve(DE,y(t));
```

To solve the IVP so that $y(0) = 3$ and $y'(0) = 2$, and plot the result:

```
Y:=dsolve({DE,y(0)=3,D(y)(0)=2},y(t));
plot(rhs(Y),t=0..6);
```

Note: `rhs` is Maple for "right-hand-side"