

## Plotting Slope Fields in Maple

Exercises 1.3.25 & 1.3.26 due Monday 2/23 at my office 2-121

The Maple software is available on computers in the SINC sites on campus as well as in the MLC. There are 3 commands you must enter in Maple to plot a slope field:

1. First load the package called DEtools which enables the software to handle differential equations.

***with(DEtools):***

Each command entered in maple must end with either **:** or **;**

**;** means we want maple to accept the command and display output.

**:** means we want maple to accept the command but not display output.

It doesn't really matter which you choose, but **;** will give you a bit more feedback.

2. Next, we define our differential equation.

***ode := diff(P(t),t) = 0.25 \* P(t) - 0.05 \* P(t)^2;***

**:=** is how we define things in Maple. Here we are defining **ode** to be the differential equation on the right. You can call it anything you want. I chose "ode" to stand for "ordinary differential equation".

**diff(P(t),t)** means to differentiate the function **P(t)** once with respect to **t**. If you want to differentiate twice you would enter **diff(P(t),t,t)**.

**\*** means multiply.

**^** means exponentiate

3. Finally, we plot a slope field. (This will not work before entering **with(DEtools)** as we did above!)

***DEplot(ode,P(t),t=0..50,P=0..8,arrows=line);***

**DEplot()** takes several entries within the parentheses separated by commas.

**ode** is the differential equation we want to plot

**P(t)** is the function we want to plot.

**t=0..50** describes the domain of t values on the t-axis in the plot

**P=0..8** describes the range of P values on the P-axis in the plot

**arrows=line** tells Maple that we wish to plot a slope field using short line segments, as is done in your text book.

Enter the above commands into Maple and generate a slope field. Then modify the differential equation above to match the one in exercise 1.3.26. Plot the corresponding slope field, print it, and use this printout to answer the questions in exercise 26 as accurately as possible. To generate a useful slope field you will have to adjust domain and range values when entering the **DEplot** command.

Do the same for exercise 1.3.25.

I recommend you play around with this since it is a useful tool. Try plotting slope fields for other differential equations. You can get maple to plot a solution curve as well by including initial data in the form **[P(a)=b]** in the **DEplot** command just before **arrows=line**. For example,

***DEplot(ode,P(t),t=0..50,P=0..8,[P(0)=3],arrows=line);***