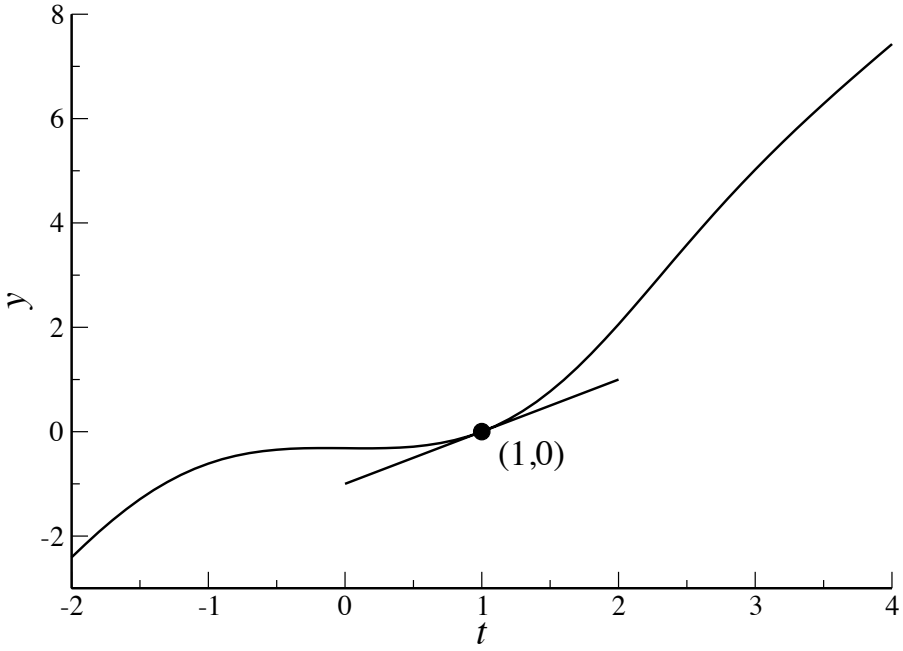
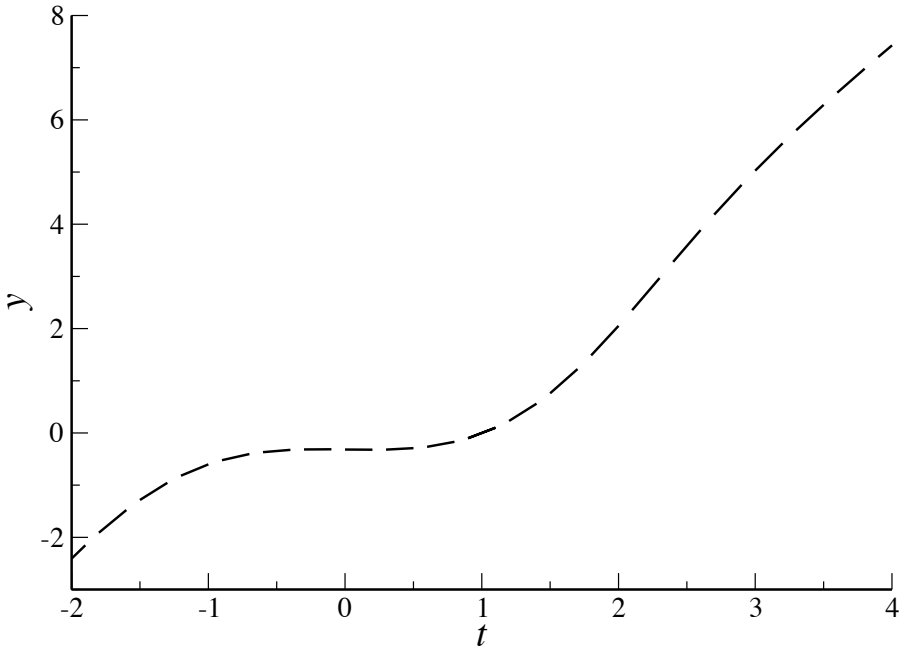
Slope Field for the Differential Equation $\frac{dy}{dt} = t^2 - \frac{1}{4}y^2$

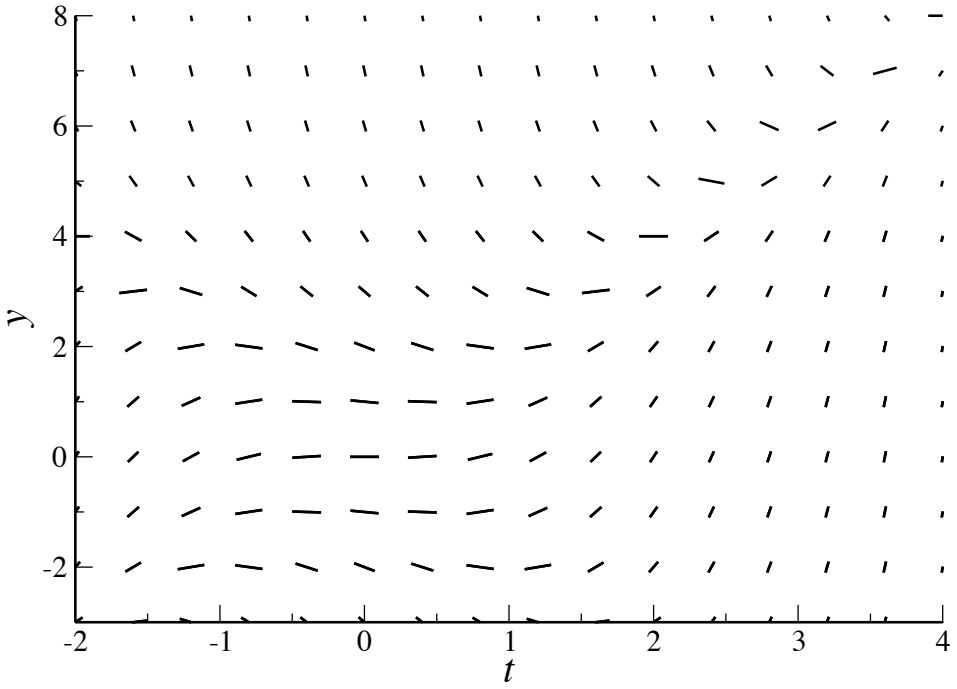
1. The right hand side of the differential equation gives us the slope of a solution curve at the point $(t\,,\,y)$



2. Short line segments, each having the slope given by the differential equation at various points, indicate the direction in which the solution curve moves



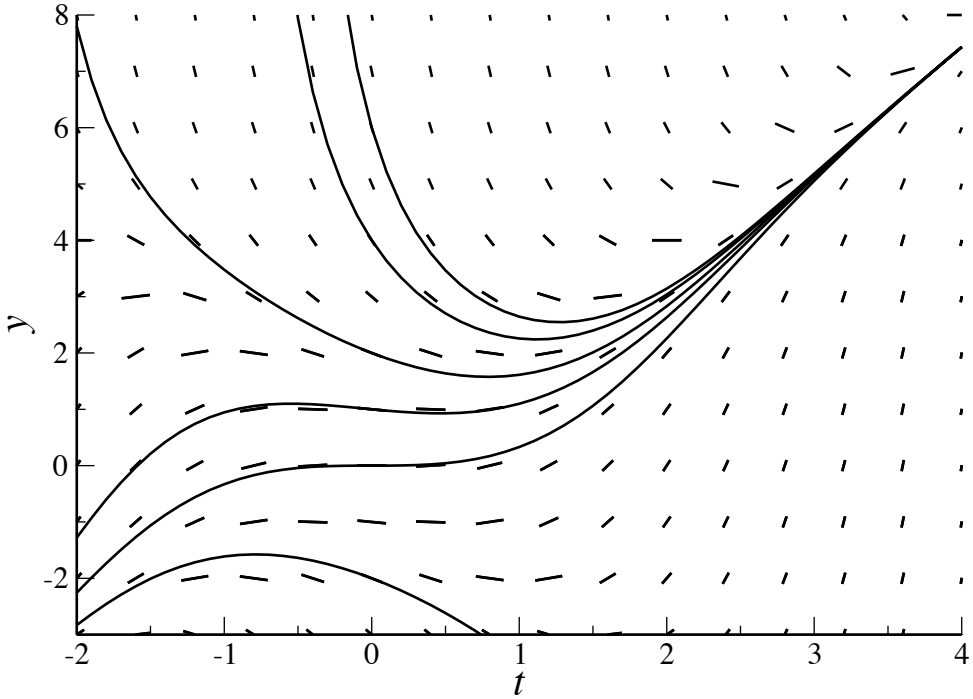
3. The slope field is a collection of short line segments, each drawn through a grid of points (t, y), each segment having slope given by the right hand side of the differential equation evaluated at (t, y).



(In this figure, don't put any interpretation on the lengths of the line segment: ideally, they should be of the same length, but I didn't manage to do this.)

There are many computer programs that you can use to generate slope fields.

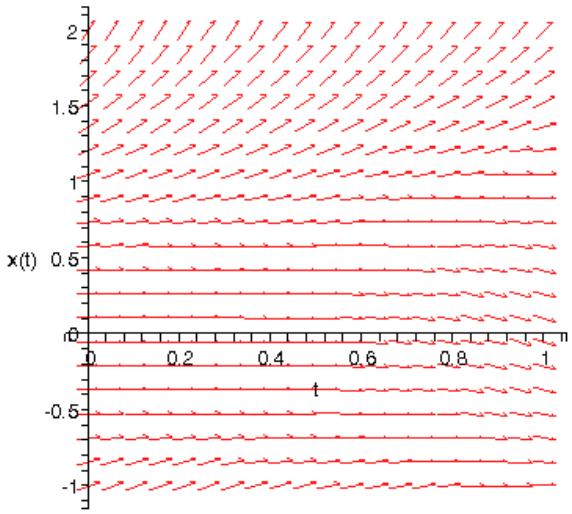
4. A visual indication of solution curves can be obtained by following the line segments.



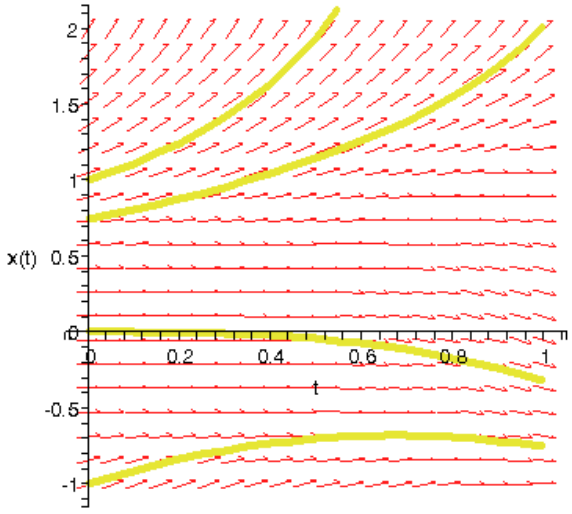
As we have mentioned: notice that there are many different solution curves, corresponding to different initial conditions.

Slope Fields in Maple

```
> with(DEtools):
> DEplot(diff(x(t),t)=x(t)^2-t^2, x(t), t=0..1,x=-1..2);
```




```
> DEplot(diff(x(t),t)=x(t)^2-t^2, x(t), t=0..1,x=-1..2,[[x(0)=0],[x(0)=1],[x(0)=0.75],[x(0)=-1]]);
```



Online slope field applets:
https://www.geogebra.org/m/W7dAdgqc
http://www.bluffton.edu/homepages/facstaff/nesterd/java/slopefields.html