Math 3130 - Introduction to Differential Equations

Example from 4.2

```
> restart;
  with(plots):
  with(DEtools):
```

```
> DEsys := [diff(y(t),t)=v(t),diff(v(t),t)=-2*y(t)-2*v(t)+sin(t)];
```

$$DEsys := \left[\frac{d}{dt}\,y(t) = v(t),\ \frac{d}{dt}\,v(t) = -2\,y(t) - 2\,v(t) + \sin(t)\right] \tag{1}$$

```
> dsolve(DEsys);
```

$$\left\{v(t) = -e^{-t}\sin(t)\,\_C2 + e^{-t}\cos(t)\,\_C2 - e^{-t}\cos(t)\,\_C1 - e^{-t}\sin(t)\,\_C1 + \frac{2\sin(t)}{5} + \frac{\cos(t)}{5},\right. \tag{2}$$

$$\left. y(t) = e^{-t}\sin(t)\,\_C2 + e^{-t}\cos(t)\,\_C1 - \frac{2\cos(t)}{5} + \frac{\sin(t)}{5}\right\}$$

```
> dsolve([diff(y(t),t,t)+2*diff(y(t),t)+2*y(t)=sin(t),y(0)=1,D(y)(0)=1])
  ;
```

$$y(t) = \frac{11\,e^{-t}\sin(t)}{5} + \frac{7\,e^{-t}\cos(t)}{5} - \frac{2\cos(t)}{5} + \frac{\sin(t)}{5} \tag{3}$$

```
> DEplot(DEsys,[y(t),v(t)],t=0..20,{[0,1,1],[0,0.3,0.3]},y=-1.5..1.5,v=
  -1.5..1.5,numpoints=5000);
```