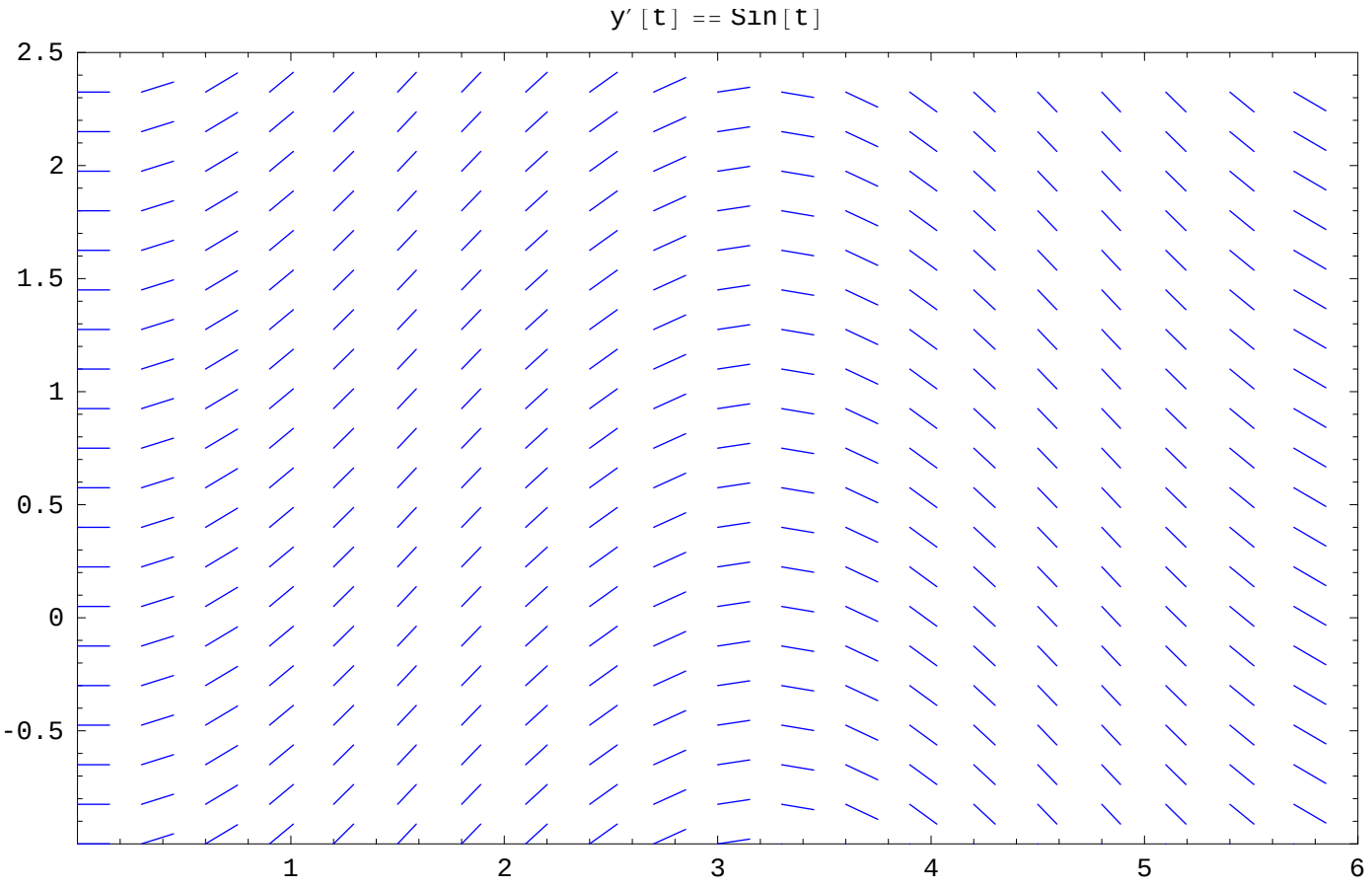
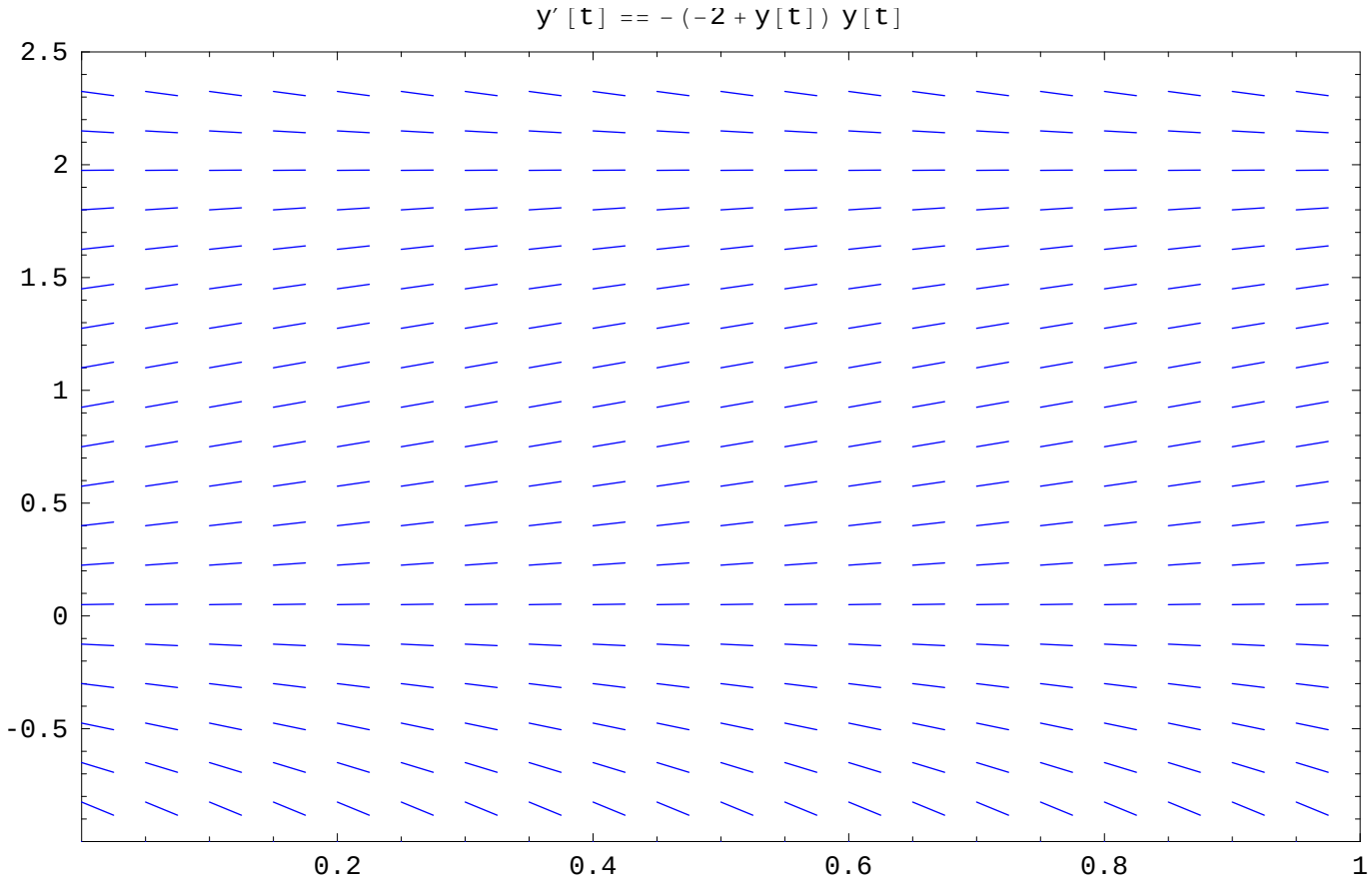
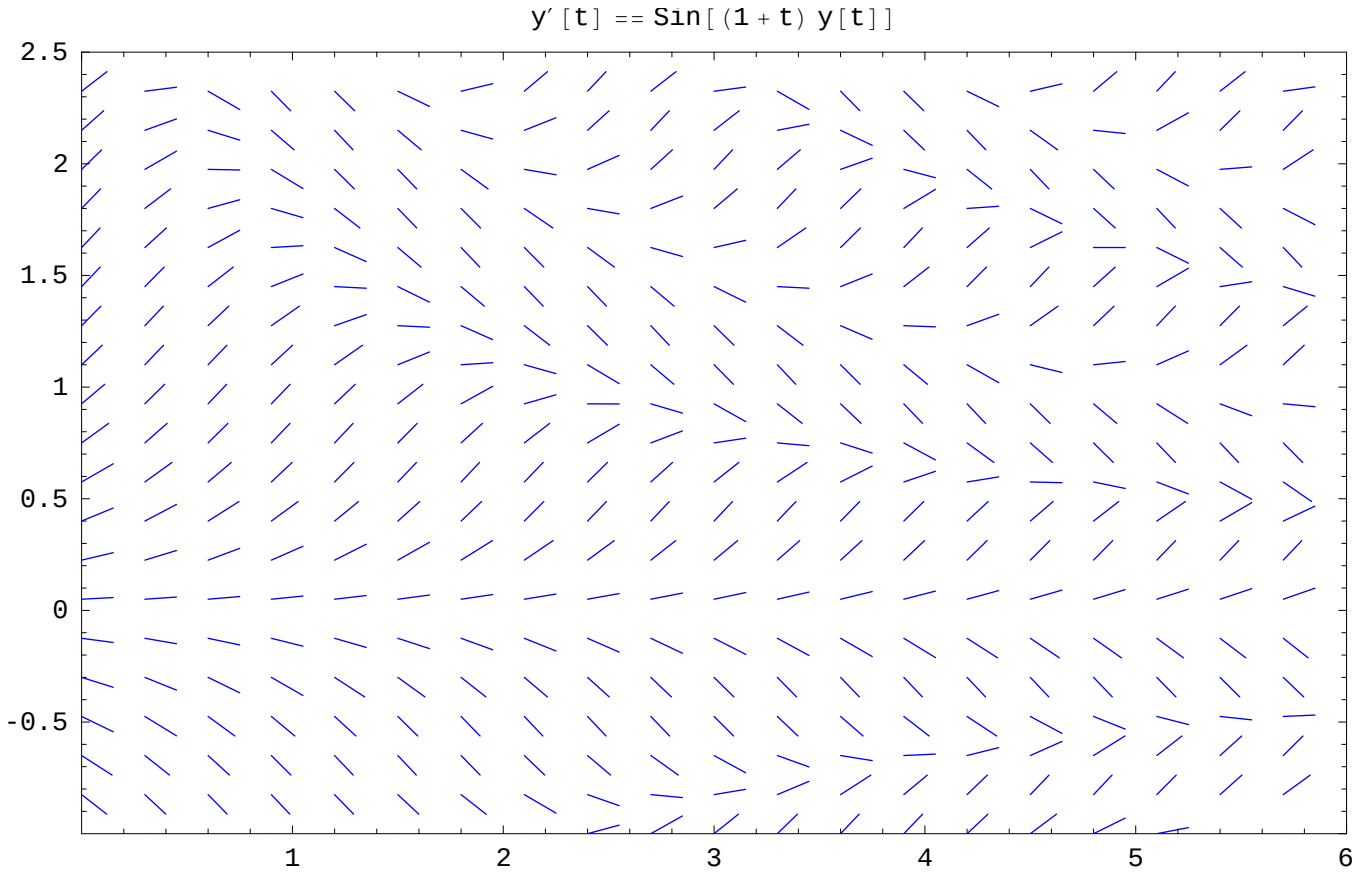
Slopefields




y′[t] == -(-2 + y[t]) y[t]
2.5
2
1.5
1
0.5
0
-0.5
0.2
0.4
0.6
0.8
1


y′[t] == Sin[(1 + t) y[t]]
2.5
2
1.5
1
0.5
0
-0.5
1
2
3
4
5
6

DSolve!

In[2]:=
```
DSolve[
  y''[t] == -4 y[t],
  y[t], t]
```

Out[2]=
$$\{\{y(t) \to c_2 \cos(2\,t) - c_1 \sin(2\,t)\}\}$$

In[6]:=
```
DSolve[
 {
  y''[t] == -4 y[t],
  y[0] == 1,
  y'[0] == 1
  },
 y[t], t]
```

Out[6]=
$$\left\{\left\{y(t) \to \cos(2\,t) + \frac{1}{2}\sin(2\,t)\right\}\right\}$$

In[8]:=
```
DSolve[
  y''[t] == -4 y[t] + Sin[2 t],
  y[t], t] // Simplify
```

Out[8]=
$$\left\{\left\{y(t) \to \left(c_2 - \frac{t}{4}\right)\cos(2\,t) - c_1 \sin(2\,t)\right\}\right\}$$

In[9]:=
```
DSolve[
  y''[t] == -4 y[t] + Sin[3 t],
  y[t], t] // Simplify
```

Out[9]=

$$\left\{\left\{y(t) \to c_2 \cos(2\,t) - c_1 \sin(2\,t) - \frac{1}{5}\sin(3\,t)\right\}\right\}$$

Checking Solutions

In[12]:=
```
DSolve[
 {
  y'[x] == -y[x] + x^2,
  y[0] == 1
  },
 y[x], x] // Simplify
```

Out[12]= $\{\{y(x) \to x^2 - 2\,x - e^{-x} + 2\}\}$

In[16]:=
```
ysol[x_] = x^2 - 2 x - E^(-x) + 2

ysol'[x] == - ysol[x] + x^2
ysol[0] == 1
```

Out[16]= $x^2 - 2\,x - e^{-x} + 2$

Out[17]= True

Out[18]= True