Exercise 25, p. 163 (Section 3.4)

```
> Eqn1:=diff(y(t),t$2)+2*diff(y(t),t)+6*y(t)=0;
```

$$Eqn1 := \frac{d^2}{dt^2}\,y(t) + 2\left(\frac{d}{dt}\,y(t)\right) + 6\,y(t) = 0 \qquad (1)$$

```
> Y1:=dsolve({Eqn1,y(0)=2,D(y)(0)=alpha},y(t));
```

$$Y1 := y(t) = \frac{1}{5}\,(\alpha+2)\,\sqrt{5}\,e^{-t}\sin\left(\sqrt{5}\,t\right) + 2\,e^{-t}\cos\left(\sqrt{5}\,t\right) \qquad (2)$$

```
> Y2:=rhs(Y1);
```

$$Y2 := \frac{1}{5}\,(\alpha+2)\,\sqrt{5}\,e^{-t}\sin\left(\sqrt{5}\,t\right) + 2\,e^{-t}\cos\left(\sqrt{5}\,t\right) \qquad (3)$$

Find alpha so that y=0 when t=1

```
> Y3:=subs(t=1,Y2);
```

$$Y3 := \frac{1}{5}\,(\alpha+2)\,\sqrt{5}\,e^{-1}\sin\left(\sqrt{5}\right) + 2\,e^{-1}\cos\left(\sqrt{5}\right) \qquad (4)$$

```
> S1:=solve(Y3=0,alpha);
```

$$S1 := -\frac{2}{5}\,\frac{\left(\sqrt{5}\,\sin\left(\sqrt{5}\right) + 5\cos\left(\sqrt{5}\right)\right)\sqrt{5}}{\sin\left(\sqrt{5}\right)} \qquad (5)$$

```
> S2:=solve(Y2=0,t);
```

$$S2 := -\frac{1}{5}\,\arctan\left(\frac{2\sqrt{5}}{\alpha+2}\right)\sqrt{5} \qquad (6)$$

```
> limit(S2,alpha=infinity);
```

$$0 \qquad (7)$$