4.4.10
Brannon and Boyce (baby 3rd ed.)

See corrected version; this contains several errors.

---

solution

```
lambda = -1 / 16;
omega = Sqrt[253 / 3] / 16;

y[t_] = -(3 / omega) E^(-t / 16) Sin[omega t]
```

$$-48\sqrt{\frac{3}{253}}\,e^{-t/16}\,\text{Sin}\left[\frac{1}{16}\sqrt{\frac{253}{3}}\,t\right]$$

```
Simplify[16 y''[t] + 16 y[t] / 3 + 2 y'[t]]
```

0

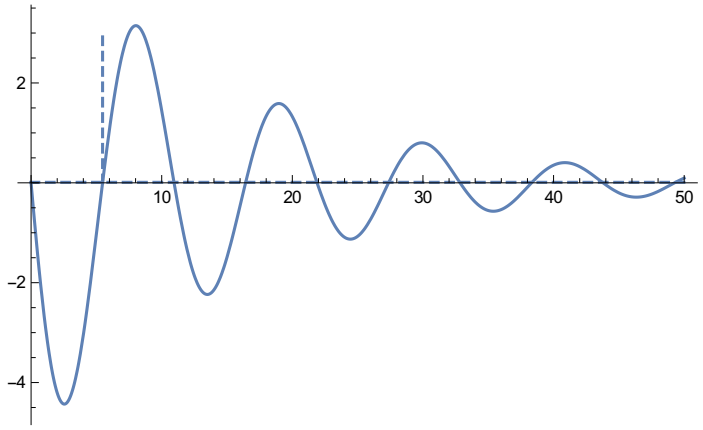
```
y[0]
y'[0]
```

0

-3

first pass through equilibrium

```
basicplot = Show[Plot[y[t], {t, 0, 50}],
  ParametricPlot[{Pi / omega, t}, {t, 0, 3}, PlotStyle -> Dashed],
  Plot[0.01, {t, 0, 50}, PlotStyle → Dashed]]
```



small amplitude

```
theta = N[Pi + ArcTan[-16 omega]]
```

```
1.67926
```

```
atleast = (theta - 16 omega Log[0.01 / (3 Sqrt[3])]) / Pi
```

```
18.8132
```

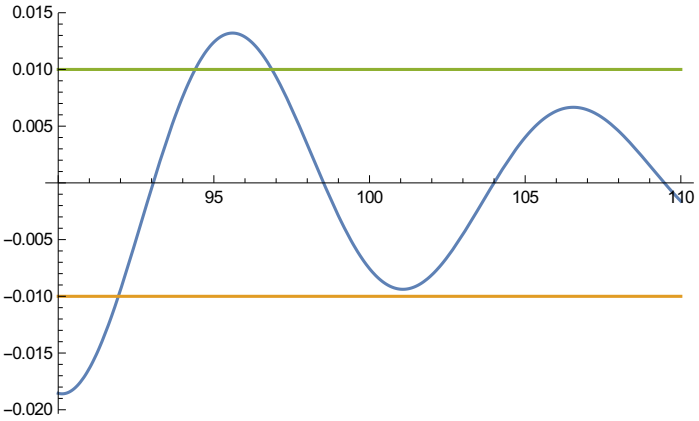
```
j = 19
t1 = (Pi - theta) / omega
t19 = (19 Pi - theta) / omega
```

```
19
```

```
2.5478
```

```
101.072
```

```
farplot = Plot[{y[t], -0.01, 0.01}, {t, 90, 110}]
```




```
Show[farplot, ParametricPlot[{t19, t}, {t, -0.01, 0.01}, PlotStyle -> Dashed]]
```