

# DampedDrivenPendulum

```
In[343]:= Clear["Global`*"]
```

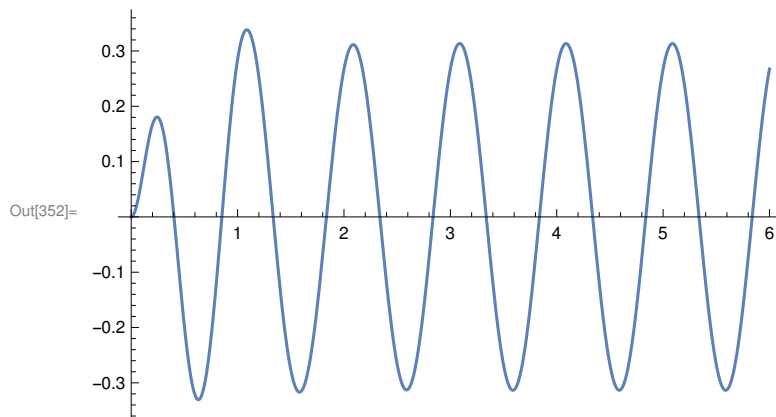
```
(* Use parameters from Taylor Chapter 12 *)
```

```
In[345]:= omega = 2 * Pi;  
omega0 = (3 / 2) * omega;  
b = omega0 / 4;
```

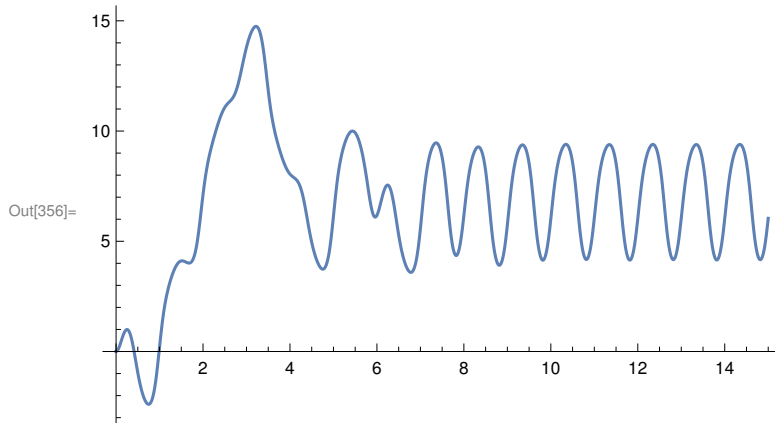
```
In[348]:= zero = (x''[t] + 2 * b * x'[t] + omega0^2 * Sin[x[t]]  
- gamma * omega0^2 * Cos[omega * t])
```

```
Out[348]= -9 gamma  $\pi^2$  Cos[2  $\pi$  t] + 9  $\pi^2$  Sin[x[t]] +  $\frac{3}{2}$   $\pi$  x'[t] + x''[t]
```

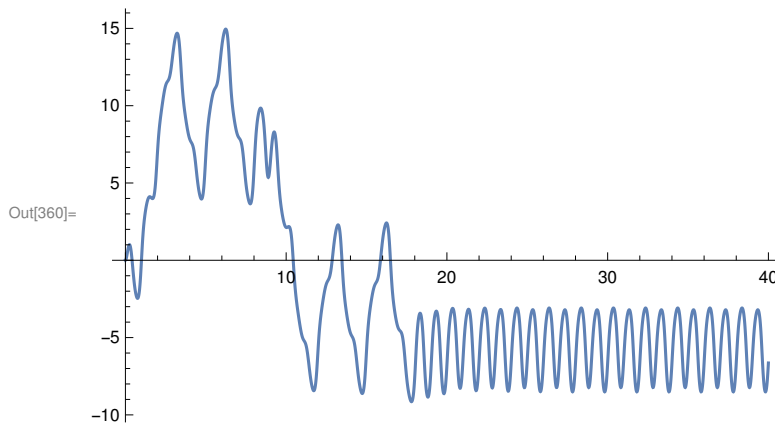
```
In[349]:= tmax = 6;  
gam = 0.2;  
nd = NDSolve[{0 == zero /. gamma -> gam, x[0] == 0, x'[0] == 0},  
x[t], {t, 0, tmax}];  
Plot[x[t] /. nd[[1]], {t, 0, tmax}]
```



```
In[353]:= tmax = 15;  
gam = 1.06;  
nd = NDSolve[{0 == zero /. {gamma -> gam}, x[0] == 0, x'[0] == 0}, x[t], {t, 0, tmax}];  
Plot[x[t] /. nd[[1]], {t, 0, tmax}]
```



```
In[357]:= tmax = 40;  
gam = 1.073;  
nd = NDSolve[{0 == zero /. {gamma -> gam}, x[0] == 0, x'[0] == 0}, x[t], {t, 0, tmax}];  
Plot[x[t] /. nd[[1]], {t, 0, tmax}]
```



```
In[361]:= tmax = 30;  
nd1 =  
  NDSolve[{0 == zero /. {gamma -> 1.08160}, x[0] == 0, x'[0] == 0}, x[t], {t, 0, tmax}];  
nd2 = NDSolve[{0 == zero /. {gamma -> 1.08161}, x[0] == 0, x'[0] == 0}, x[t], {t, 0, tmax}];  
Plot[{x[t] /. nd1[[1]], x[t] /. nd2[[1]]}, {t, 0, tmax}]
```

