

Physics 238

Damped Oscillations

In[417]:=

```
Clear["Global`*"]
```

In[418]:=

```
x[t_, γ_] := B Exp[p[γ] t]
```

In[419]:=

```
p[γ_] := (-γ/2) + I Sqrt[ω02 - γ2/4]
```

In[420]:=

```
ω0 = 1.0; (* For convenience in plotting *)
```

Initial Conditions -- set B = 10.0 (not exactly releasing from rest)

In[421]:=

```
B = 10.0;
```

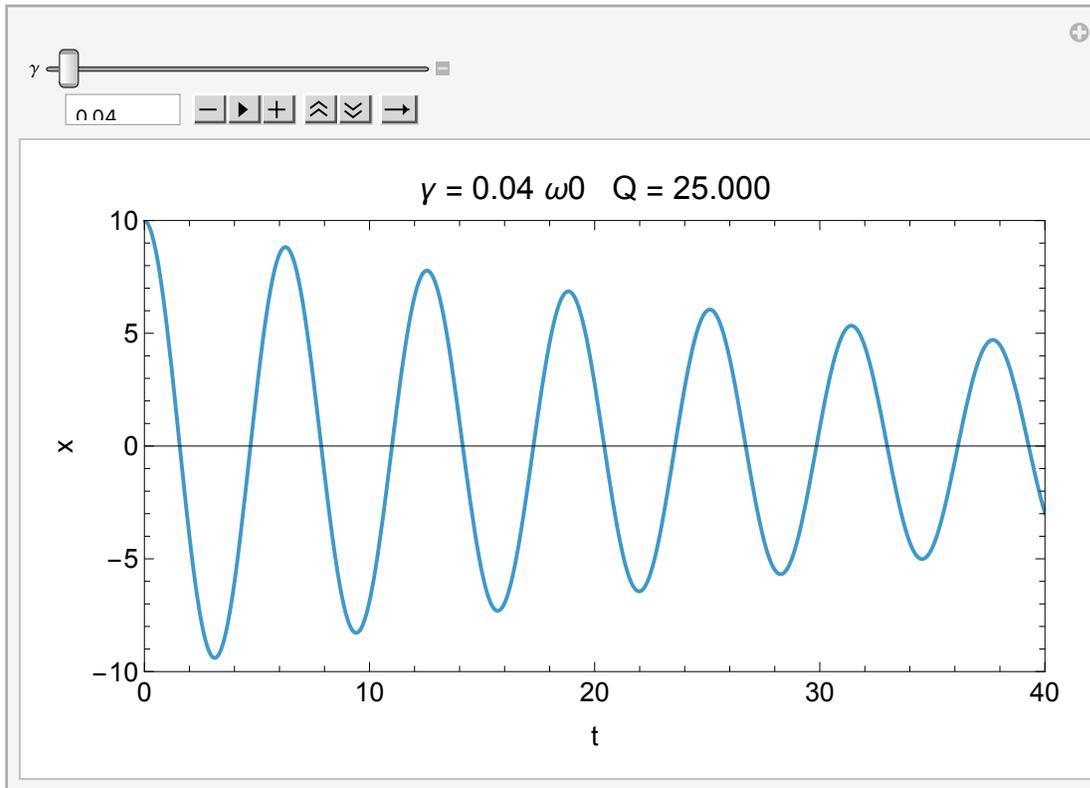
In[422]:=

```
smartlabel[γ_] := StringForm["γ = `` ω0 Q = ``",  
    NumberForm[γ, {3, 2}], NumberForm[ω0/γ, {4, 3}]] // Quiet
```

In[423]:=

```
Manipulate[Plot[Re[x[t,  $\gamma$ ]], {t, 0, 40}, PlotRange -> {{0, 40}, {-10, 10}},
  LabelStyle -> Larger, Frame -> True, PlotLabel -> smartlabel[ $\gamma$ ],
  FrameLabel -> {"t", "x"}, ImageSize -> Scaled[0.9], AspectRatio -> 1/2],
  { $\gamma$ , 0, 4, 0.02, Appearance -> "Open"}]
```

Out[423]=



In[424]:=

```
Plot[{Re[x[t, 0.5]], Re[x[t, 2.0]], Re[x[t, 8.0]]}, {t, 0, 40},
  PlotRange -> {{0, 20}, {-10, 10}}, ImageSize -> Scaled[0.7],
  AspectRatio -> 1/2, PlotStyle -> {Red, Green, Blue},
  PlotLegends -> {" $\gamma = 0.5 \omega_0$ ", " $\gamma = 2.0 \omega_0$ ", " $\gamma = 8.0 \omega_0$ "}, LabelStyle -> Larger]
```

Out[424]=

