In [2]:
```
from sympy import *
```

Example 1: Find the general solution to y'' + y = 0

In [3]:
```
t=symbols('t')
y=Function('y')
deq=diff(y(t),t,2)+y(t)
dsolve(deq,y(t))
```

Out[3]: $y(t) = C_1 \sin(t) + C_2 \cos(t)$

Example 2: Solve y'' - 2y' + 6y = 0

In [4]:
```
t=symbols('t')
y=Function('y')
deq=diff(y(t),t,2)-2*diff(y(t),t)+6*y(t)
dsolve(deq,y(t))
```

Out[4]: $y(t) = \left(C_1 \sin\left(\sqrt{5}t\right) + C_2 \cos\left(\sqrt{5}t\right)\right) e^t$

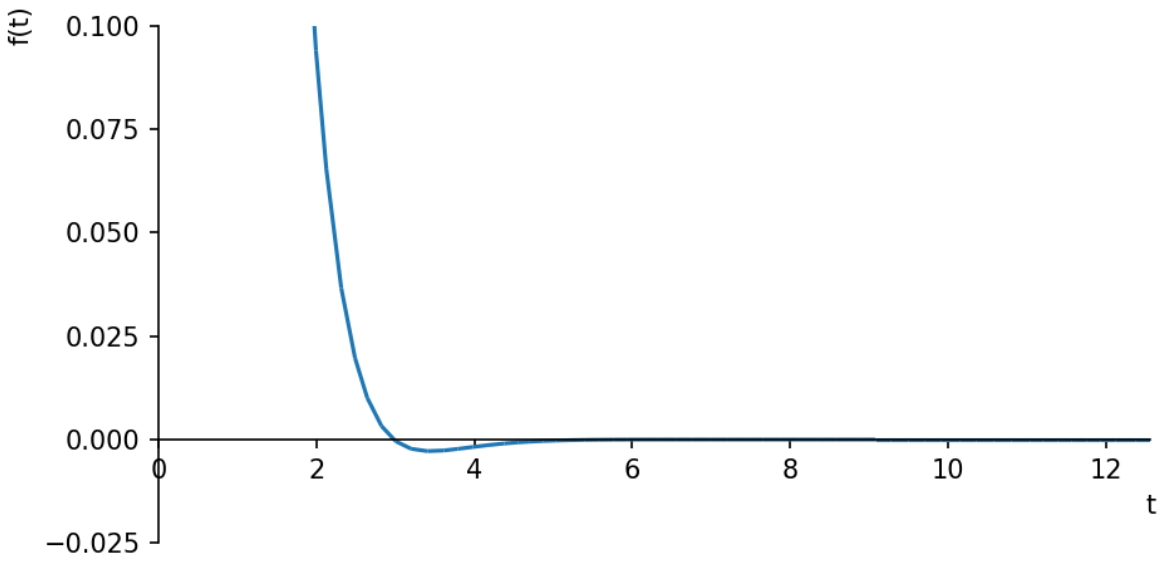
Example 3: Solve the IVP y'' - 4y' + 5y = 0, y(0)=1, y'(0)=4 and describe the behavior as t-->oo (shown here by plot)

In [5]:
```
t=symbols('t')
y=Function('y')
deq=diff(y(t),t,2)+4*diff(y(t),t)+5*y(t)
ysoln=dsolve(deq,y(t),ics={y(0):1,diff(y(t),t).subs(t,0):4})
print('Solution is',ysoln)
```

```
Solution is Eq(y(t), (6*sin(t) + cos(t))*exp(-2*t))
```

In [6]:
```
matplotlib notebook
```

In [8]:
```
ypart=ysoln.rhs
plot(ypart,(t,0,4*pi),ylim=[-0.1,0.1])
```



Out[8]: <sympy.plotting.plot.Plot at 0x9698a10>

In [ ]: