In [1]:
```
from sympy import *
```

Example 1: Use the Convolution Theorem to find the inverse laplace transform of F(s)=1/((s)(s^2+4))

In [2]:
```
t,s=symbols('t s',positive=True)
F=1/s
G=1/(s**2+4)
# Finding inverse laplace transform directly
h=inverse_laplace_transform(F*G,s,t)
print('The inverse Laplace Transform of F*G is',h)
f=inverse_laplace_transform(F,s,t)
g=inverse_laplace_transform(G,s,t)
tau=symbols('tau')
hconv=f.subs(t,t-tau)*g.subs(t,tau)
print('Convolution integrand is',hconv)
h=integrate(hconv,(tau,0,t))
print('=',h)
```

```
The inverse Laplace Transform of F*G is 1/4 - cos(2*t)/4
Convolution integrand is sin(2*tau)/2
= 1/4 - cos(2*t)/4
```

Example 2: Use the Convolution Theorem to find the inverse Laplace Transform of 1/(s^2*(s^2+2s+10))

In [3]:
```
t,s=symbols('t s',positive=True)
F=1/s**2
G=1/(s**2+2*s+10)
# Finding inverse laplace transform directly
h=inverse_laplace_transform(F*G,s,t)
print('The inverse Laplace Transform of F*G is',h)
# Direct didn't work-used partial fractions, then inverse LT instead
LTparfrac=apart(F*G,s)
h=inverse_laplace_transform(LTparfrac,s,t)
print('Using partial fractions, we obtain',h)
f=inverse_laplace_transform(F,s,t)
g=inverse_laplace_transform(G,s,t)
tau=symbols('tau')
hconv=f.subs(t,t-tau)*g.subs(t,tau)
print('Convolution integrand is',hconv)
h=integrate(hconv,(tau,0,t))
print('=',h)
```

```
The inverse Laplace Transform of F*G is InverseLaplaceTransform(1/(s**4 + 2
*s**3 + 10*s**2), s, t, _None)
Using partial fractions, we obtain t/10 - 1/50 - 2*exp(-t)*sin(3*t)/75 + ex
p(-t)*cos(3*t)/50
Convolution integrand is (t - tau)*exp(-tau)*sin(3*tau)/3
= t/10 - 1/50 - 2*exp(-t)*sin(3*t)/75 + exp(-t)*cos(3*t)/50
```

In [ ]:
```

```