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

Example 2 (1 is easy enough to do by hand): Show that the general solutions found for the ODE y'' + y' - 6y = 0 form a fundamental set of solutions.

In [3]:
```
# Recall this example from 3.1
t=symbols('t')
y=Function('y')
deq=diff(y(t),t,2)+diff(y(t),t)-6*y(t)
ysoln=dsolve(deq,y(t))
print('The solution to the ODE is',ysoln)
print('So the individual solutions are y(t)=e^(-3t) and y(t)=e^(2t).')
# Compute the Wronskian to show it is never 0. Using a built-in function in Python: 'wronskian'
y1=exp(-3*t)
y2=exp(2*t)
Wronsk=wronskian([y1,y2],t) #inputs: list of functions, indep variable
print('The Wronskian is',Wronsk)
Wis0=solve(Wronsk,t)
print('Wronskian is 0 when t=',Wis0,'so the solutions form a fundamental set.')
```

```
The solution to the ODE is Eq(y(t), C1*exp(-3*t) + C2*exp(2*t))
So the individual solutions are y(t)=e^(-3t) and y(t)=e^(2t).
The Wronskian is 5*exp(-t)
Wronskian is 0 when t= [] so the solutions form a fundamental set.
```

Example 3: Show that the general solutions found for the ODE 2y'' + 7y' + 6y = 0 form a fundamental set of solutions.

In [4]:
```
# Recall this example from 3.1
t=symbols('t')
y=Function('y')
deq=2*diff(y(t),t,2)+7*diff(y(t),t)+6*y(t)
ysoln=dsolve(deq,y(t))
print('The solution to the ODE is',ysoln)
print('So the individual solutions are y(t)=e^(-2t) and y(t)=e^(-3/2t).')
# Compute the Wronskian to show it is never 0.
t=symbols('t')
y1=exp(-2*t)
y2=exp(-3/2*t)
Wronsk=wronskian([y1,y2],t)
print('The Wronskian is',Wronsk)
Wis0=solve(Wronsk,t)
print('Wronskian is 0 when t=',Wis0,'so the solutions form a fundamental se
t.')
```

```
The solution to the ODE is Eq(y(t), C1*exp(-2*t) + C2/exp(t)**(3/2))
So the individual solutions are y(t)=e^(-2t) and y(t)=e^(-3/2t).
The Wronskian is 0.5*exp(-3.5*t)
Wronskian is 0 when t= [] so the solutions form a fundamental set.
```

In [ ]: