Exercitiul 1:

In [61]:
```
diff(sin(t),t,4)-sin(t)
```

Out[61]:
```
0
```

In [62]:
```
diff(cos(t),t,4)-cos(t)
```

Out[62]:
```
0
```

In [63]:
```
diff(sinh(t),t,4)-sinh(t)
```

Out[63]:
```
0
```

In [64]:
```
diff(cosh(t),t,4)-cosh(t)
```

Out[64]:
```
0
```

Exercitiile: 2-5

In [23]:
```
t=var('t')
x=function('x')(t)
eqd2=diff(x,t)==-t*x
desolve(eqd2,x)
```

Out[23]:
```
_C*e^(-1/2*t^2)
```

In [24]:
```
t=var('t')
x=function('x')(t)
eqd3=diff(x,t,2)+x==0
desolve(eqd3,x)
```

Out[24]:
```
_K2*cos(t) + _K1*sin(t)
```

In [25]:
```
t=var('t')
x=function('x')(t)
eqd4=4*diff(x,t,2)+8*diff(x,t)+5*x==0
desolve(eqd4,x)
```

Out[25]:
```
(_K2*cos(1/2*t) + _K1*sin(1/2*t))*e^(-t)
```

In [26]:
```
t=var('t')
x=function('x')(t)
eqd5=diff(x,t,2)-3*diff(x,t)+2*x==0
desolve(eqd5,x)
```

Out[26]:
```
_K1*e^(2*t) + _K2*e^t
```

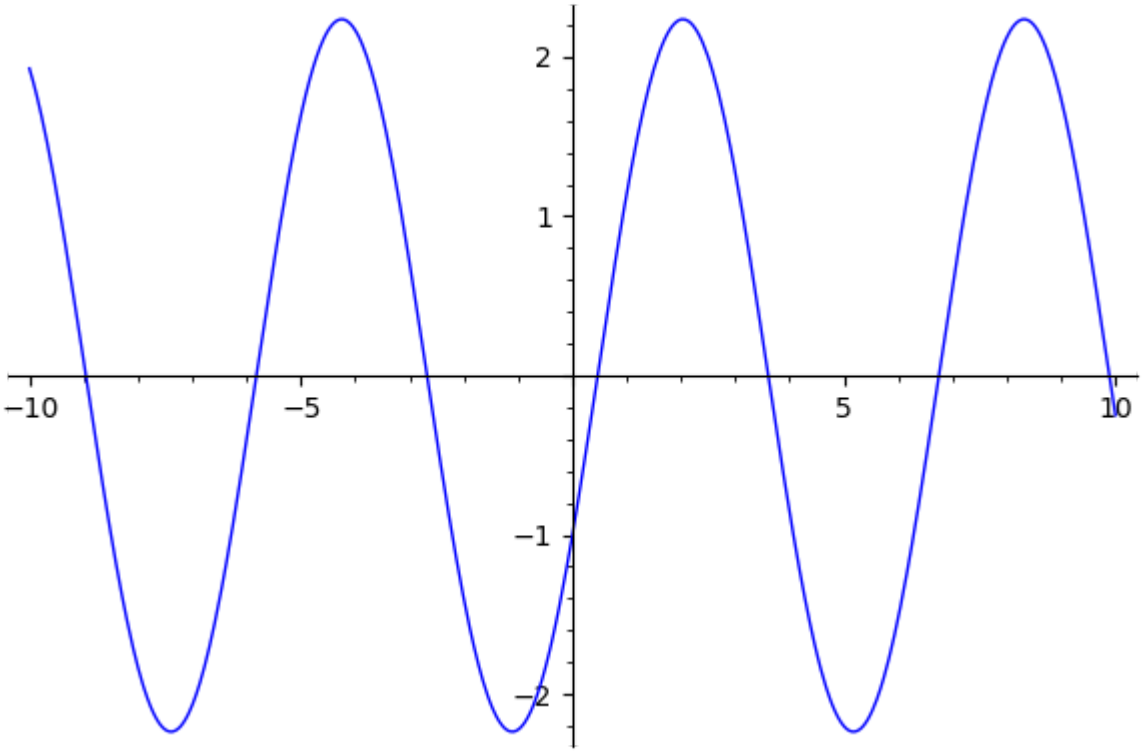
Exercitiile: 6, 7, 8

In [27]:
```
t=var('t')
x=function('x')(t)
eqd6=diff(x,t,2)+x==0
desolve(eqd6,x,ics=[pi,1,-2])
```

Out[27]:
```
-cos(t) + 2*sin(t)
```

In [73]:
```
sol6=desolve(eqd6,x,ics=[pi,1,-2])
plot(sol6,t,-10,10)
```

Out[73]:

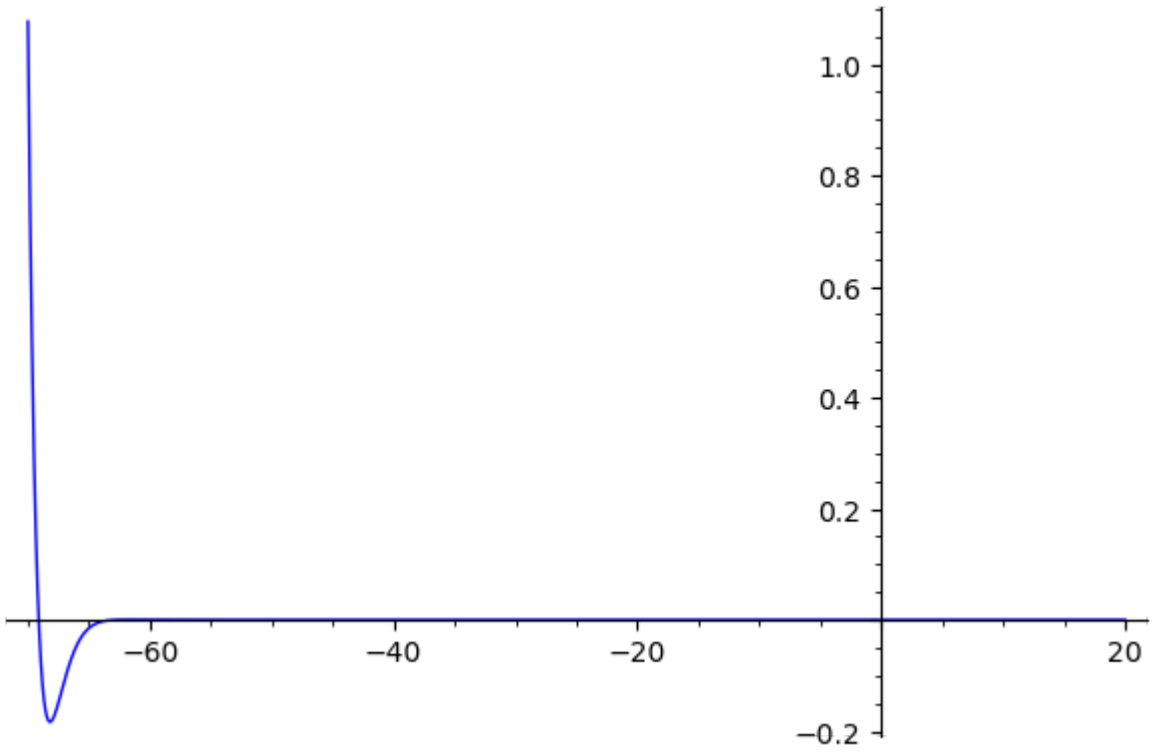


In [30]:
```
t=var('t')
x=function('x')(t)
eqd7=4*diff(x,t,2)+8*diff(x,t)+5*x==0
desolve(eqd7,x,ics=[0,0,1/2])
```

Out[30]:
```
e^(-t)*sin(1/2*t)
```

In [44]:
```
sol7=desolve(eqd7,x,ics=[0,0,1/2])
plot(sol7,t,-70,20)
```

Out[44]:

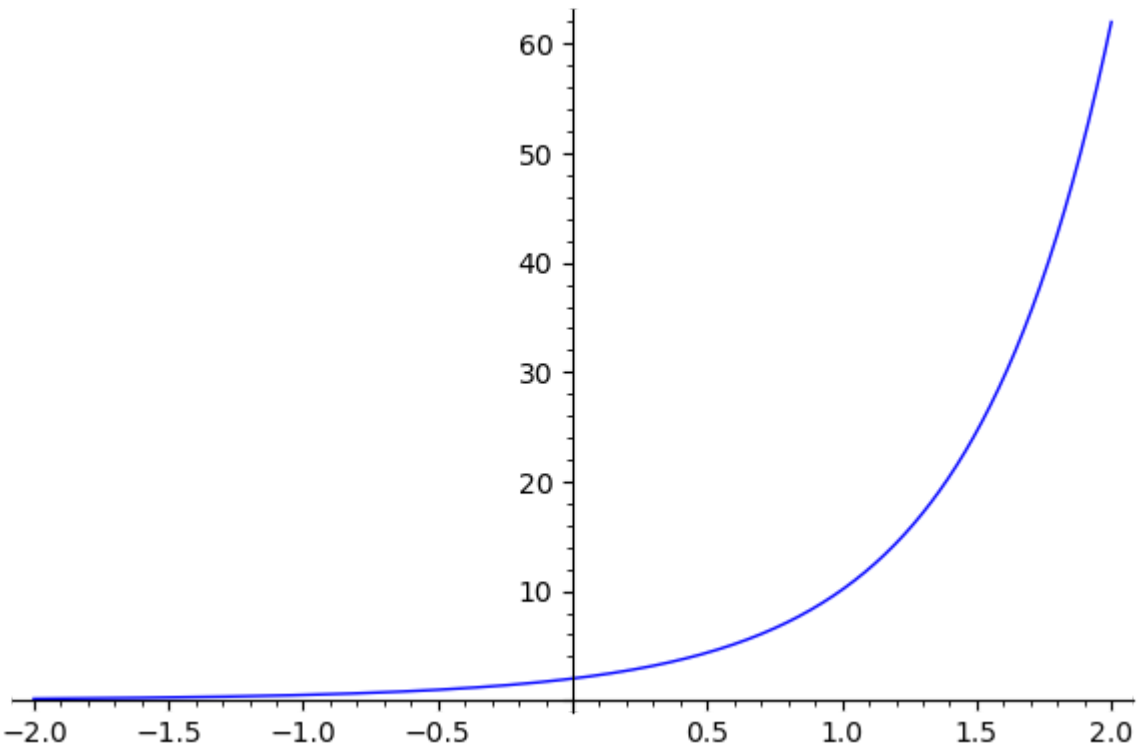


In [32]:
```
t=var('t')
x=function('x')(t)
eqd8=diff(x,t,2)-3*diff(x,t)+2*x==0
desolve(eqd8,x,ics=[0,2,3])
```

Out[32]: e^(2*t) + e^t

In [36]:
```
sol8=desolve(eqd8,x,ics=[0,2,3])
plot(sol8,t,-2,2)
```

Out[36]:



Exercitul: 9

In [67]:
```
t=var('t')
x=function('x')(t)
eqd9a=diff(x,t,2)+5*x==0
desolve(eqd9a,x)
```

Out[67]:
```
_K2*cos(sqrt(5)*t) + _K1*sin(sqrt(5)*t)
```

In [69]:
```
t=var('t')
x=function('x')(t)
eqd9b=diff(x,t,2)+t*x==0
desolve(eqd9b,x)
```

```
---------------------------------------------------------------------------
NotImplementedError                       Traceback (most recent call last)
<ipython-input-69-a04352ef314d> in <module>
      2 x=function('x')(t)
      3 eqd9b=diff(x,t,Integer(2))+t*x==Integer(0)
----> 4 desolve(eqd9b,x)

/opt/sagemath-9.2/local/lib/python3.7/site-packages/sage/calculus/desolvers.p
y in desolve(de, dvar, ics, ivar, show_method, contrib_ode, algorithm)
    595                 raise NotImplementedError("Maxima was unable to solve
this ODE.")
    596         else:
--> 597             raise NotImplementedError("Maxima was unable to solve thi
s ODE. Consider to set option contrib_ode to True.")
    598
    599     if show_method:

NotImplementedError: Maxima was unable to solve this ODE. Consider to set opt
ion contrib_ode to True.
```

In [71]:
```
t=var('t')
x=function('x')(t)
eqd9c=diff(x,t,2)+(t^5)*x==0
desolve(eqd9c,x)
```

```
---------------------------------------------------------------------------
NotImplementedError                       Traceback (most recent call last)
<ipython-input-71-7363c02d3611> in <module>
      2 x=function('x')(t)
      3 eqd9c=diff(x,t,Integer(2))+(t**Integer(5))*x==Integer(0)
----> 4 desolve(eqd9c,x)

/opt/sagemath-9.2/local/lib/python3.7/site-packages/sage/calculus/desolvers.p
y in desolve(de, dvar, ics, ivar, show_method, contrib_ode, algorithm)
    595                 raise NotImplementedError("Maxima was unable to solve
this ODE.")
    596         else:
--> 597             raise NotImplementedError("Maxima was unable to solve thi
s ODE. Consider to set option contrib_ode to True.")
    598
    599     if show_method:

NotImplementedError: Maxima was unable to solve this ODE. Consider to set opt
ion contrib_ode to True.
```

In [78]:
```
t=var('t')
x=function('x')(t)
eqd9d=diff(x,t,2)+5*x==0
desolve(eqd9d,x,ics=[0,0,0])
```

Out[78]:
```
0
```

In [79]:
```
t=var('t')
x=function('x')(t)
eqd9e=diff(x,t,2)+t*x==0
desolve(eqd9e,x,ics=[0,0,0])
```

```
---------------------------------------------------------------------------
NotImplementedError                       Traceback (most recent call last)
<ipython-input-79-2b5f51b31a0e> in <module>
      2 x=function('x')(t)
      3 eqd9e=diff(x,t,Integer(2))+t*x==Integer(0)
----> 4 desolve(eqd9e,x,ics=[Integer(0),Integer(0),Integer(0)])

/opt/sagemath-9.2/local/lib/python3.7/site-packages/sage/calculus/desolvers.p
y in desolve(de, dvar, ics, ivar, show_method, contrib_ode, algorithm)
    595                 raise NotImplementedError("Maxima was unable to solve
this ODE.")
    596         else:
--> 597             raise NotImplementedError("Maxima was unable to solve thi
s ODE. Consider to set option contrib_ode to True.")
    598
    599     if show_method:

NotImplementedError: Maxima was unable to solve this ODE. Consider to set opt
ion contrib_ode to True.
```

In [80]:
```
t=var('t')
x=function('x')(t)
eqd9f=diff(x,t,2)+(t^5)*x==0
desolve(eqd9f,x,ics=[0,0,0])
```

```
---------------------------------------------------------------------------
NotImplementedError                       Traceback (most recent call last)
<ipython-input-80-47a50a7608f4> in <module>
      2 x=function('x')(t)
      3 eqd9f=diff(x,t,Integer(2))+(t**Integer(5))*x==Integer(0)
----> 4 desolve(eqd9f,x,ics=[Integer(0),Integer(0),Integer(0)])

/opt/sagemath-9.2/local/lib/python3.7/site-packages/sage/calculus/desolvers.p
y in desolve(de, dvar, ics, ivar, show_method, contrib_ode, algorithm)
    595                 raise NotImplementedError("Maxima was unable to solve
this ODE.")
    596         else:
--> 597             raise NotImplementedError("Maxima was unable to solve thi
s ODE. Consider to set option contrib_ode to True.")
    598
    599     if show_method:

NotImplementedError: Maxima was unable to solve this ODE. Consider to set opt
ion contrib_ode to True.
```

Exercitiul: 10

In [92]:
```
t=var('t')
x=function('x')(t)
eqd10=diff(x,t,2)+x==0
desolve(eqd10,x,[0,0,pi,0])
```

Out[92]:
```
r5*sin(t)
```

Exercitiul: 11

In [93]:
```
desolve(diff(x,t,2)+x == 0,x,[0,0,pi,0],show_method=True)
```

Out[93]:
```
[r6*sin(t), 'constcoeff']
```

In [94]:
```
desolve(diff(x,t,2)+x == 0,x,[0,0,1,0])
```

Out[94]:
```
0
```

In [95]:
```
Exercitiul: 12
```

In [96]:
```
desolve(diff(x,t,2)+x == 1,x,[0,0,pi,0],show_method=True)
```

Out[96]:
```
[[], 'variationofparameters']
```

Exercitiul 12 cu ale conditii

In [97]:
```
desolve(diff(x,t,2)+x == 1,x,[0,1,pi,1],show_method=True)
```

Out[97]:
```
[r7*sin(t) + 1, 'variationofparameters']
```

Exercitiul 13, 14, 15, 16, 17, 18

In [98]:
```
desolve(diff(x,t)+x == 15,x)
```

Out[98]:
```
(_C + 15*e^t)*e^(-t)
```

In [99]:
```
desolve(diff(x,t)+x == 2*exp(t)-7*exp(-3*t),x)
```

Out[99]:
```
1/2*(2*_C + 2*e^(2*t) + 7*e^(-2*t))*e^(-t)
```

In [101]:
```
sol15=desolve(diff(x,t)+x == -t^2+3*t-7,x)
sol15.factor()
```

Out[101]:
```
-(t^2*e^t - 5*t*e^t - _C + 12*e^t)*e^(-t)
```

In [102]:
```
desolve(diff(x,t)+x == sin(t)+3*cos(t),x)
```

Out[102]:
```
1/2*(3*(cos(t) + sin(t))*e^t - (cos(t) - sin(t))*e^t + 2*_C)*e^(-t)
```

In [103]:
```
desolve(diff(x,t)+x == sin(t),x)
```

Out[103]:
```
-1/2*((cos(t) - sin(t))*e^t - 2*_C)*e^(-t)
```

In [104]:
```
desolve(diff(x,t)+x == 2*cos(t),x)
```

Out[104]:
```
((cos(t) + sin(t))*e^t + _C)*e^(-t)
```

In [ ]:
```

```