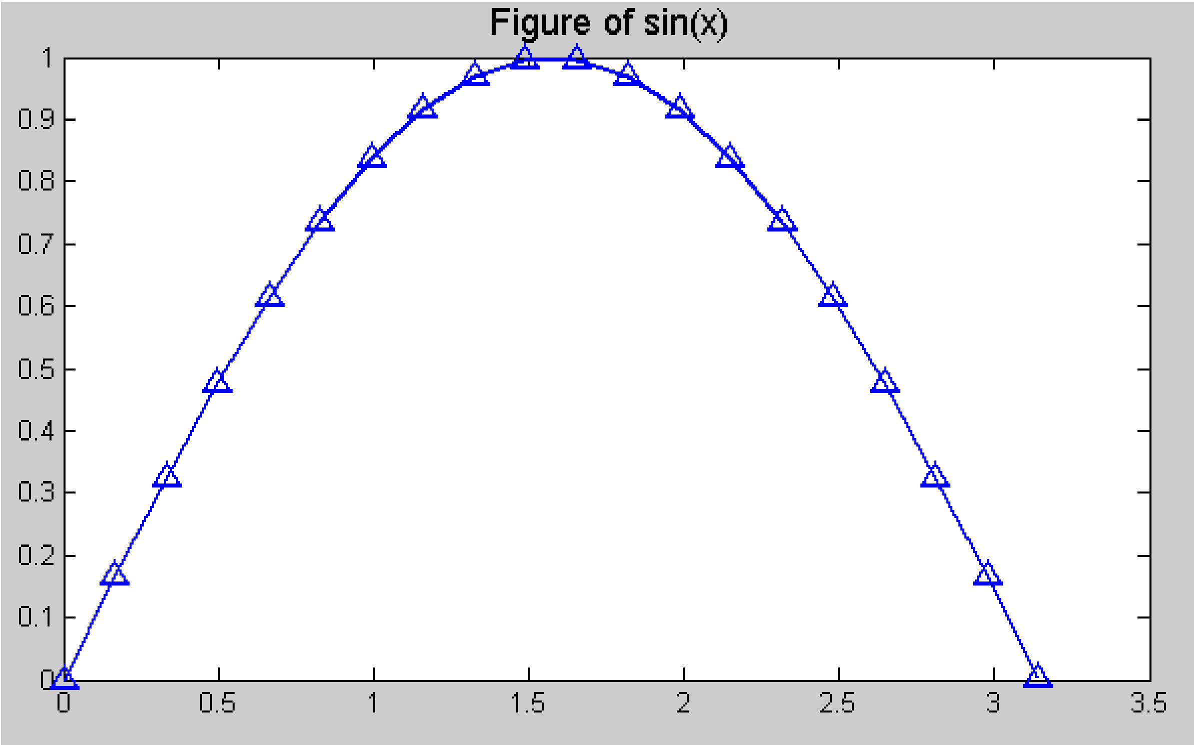
< Graphics in Matlab >

[plot]

```
>> x = linspace(0, pi, 20);
>> y = sin(x);
>> plot(x, y, 'b-^', 'linewidth', 2, 'markersize', 10)
>> title(' Figure of sin(x)', 'fontsize', 13)
```



Color :

r g b c m y k w

Marker :

o * . + x s d ^ v

> < p h

Line style :

- -- : -.

xlabel ylabel

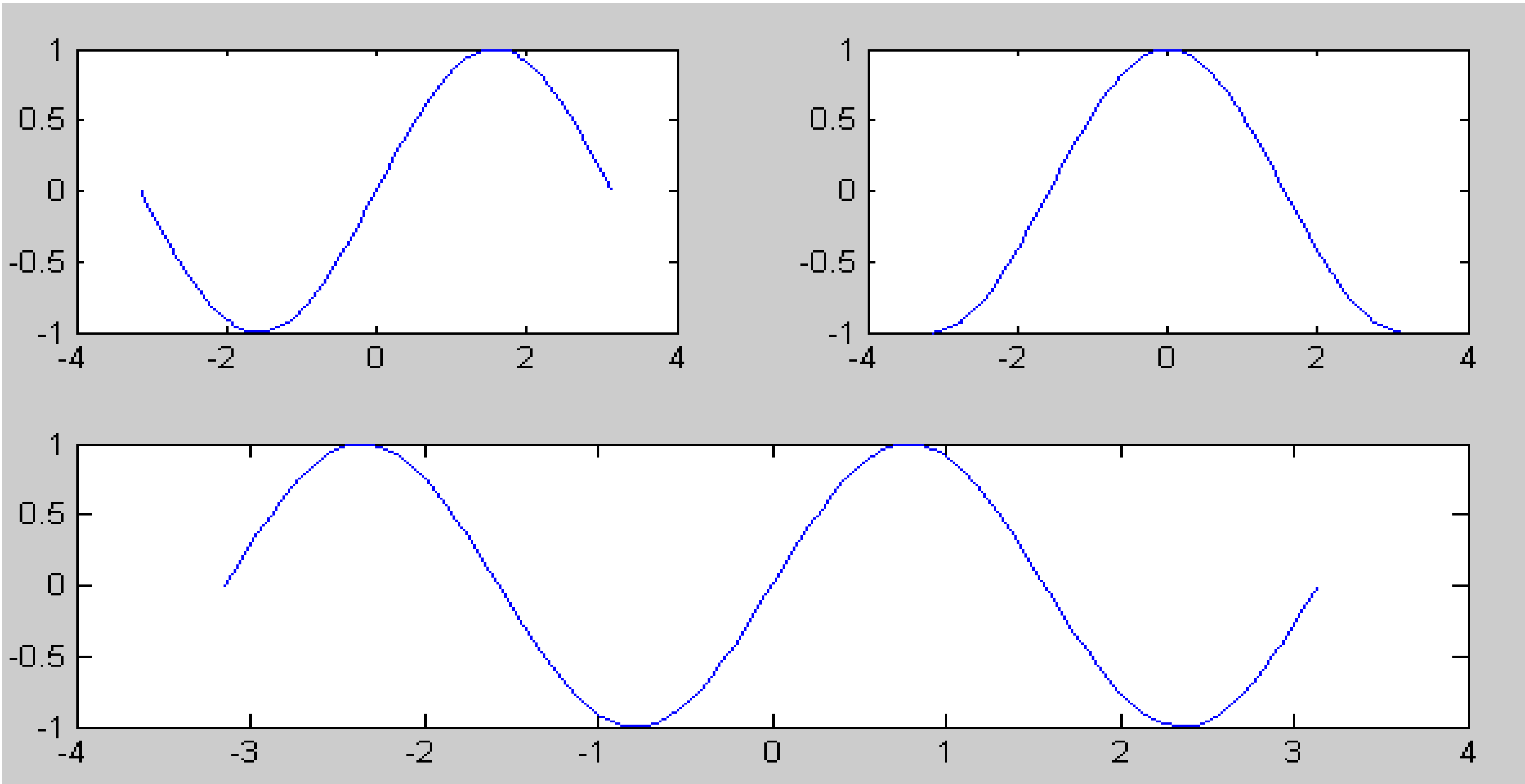
text gtext

axis grid legend

subplot fplot ezplot loglog semilogx semilogy

```
>> x = linspace(-pi, pi, 100);
>> subplot(2,2,1),    plot( x, sin(x) )
>> subplot(2,2,2),    plot( x, cos(x) )
>> subplot(2,2,3:4),  plot( x, sin(2*x) )
```

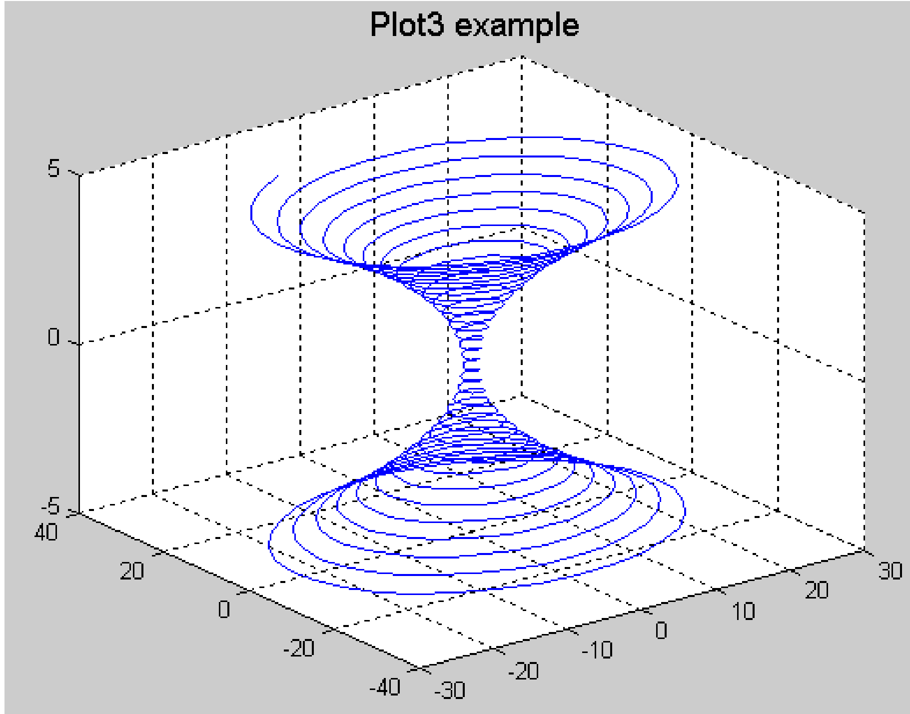
```
>> fplot( 'sin', [-3,3] )
>> fplot( @cos, [-3,3] )
```



< 3D Graphics in Matlab >

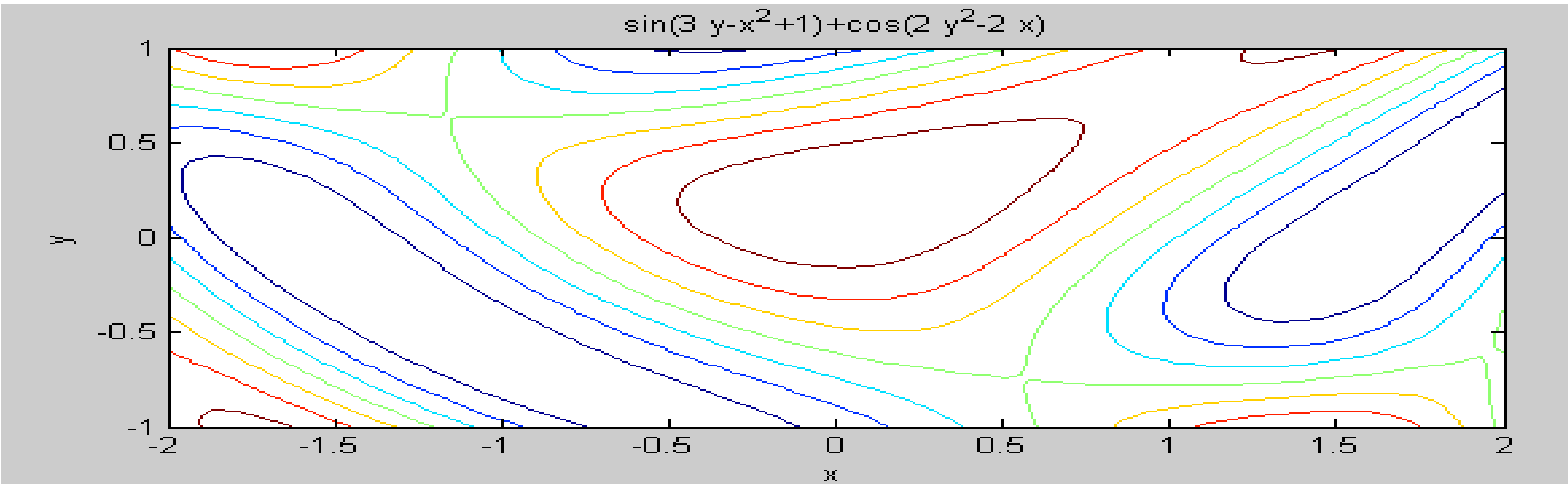
[plot3]

```
>> t = linspace(-5, 5, 200);
>> x = (1+t.^2).*sin(20*t);
>> y = (1+t.^2).*cos(20*t);
>> z = t;
>> plot3(x, y, z),  grid on
>> title(' Plot3 example', 'fontsize', 14)
```



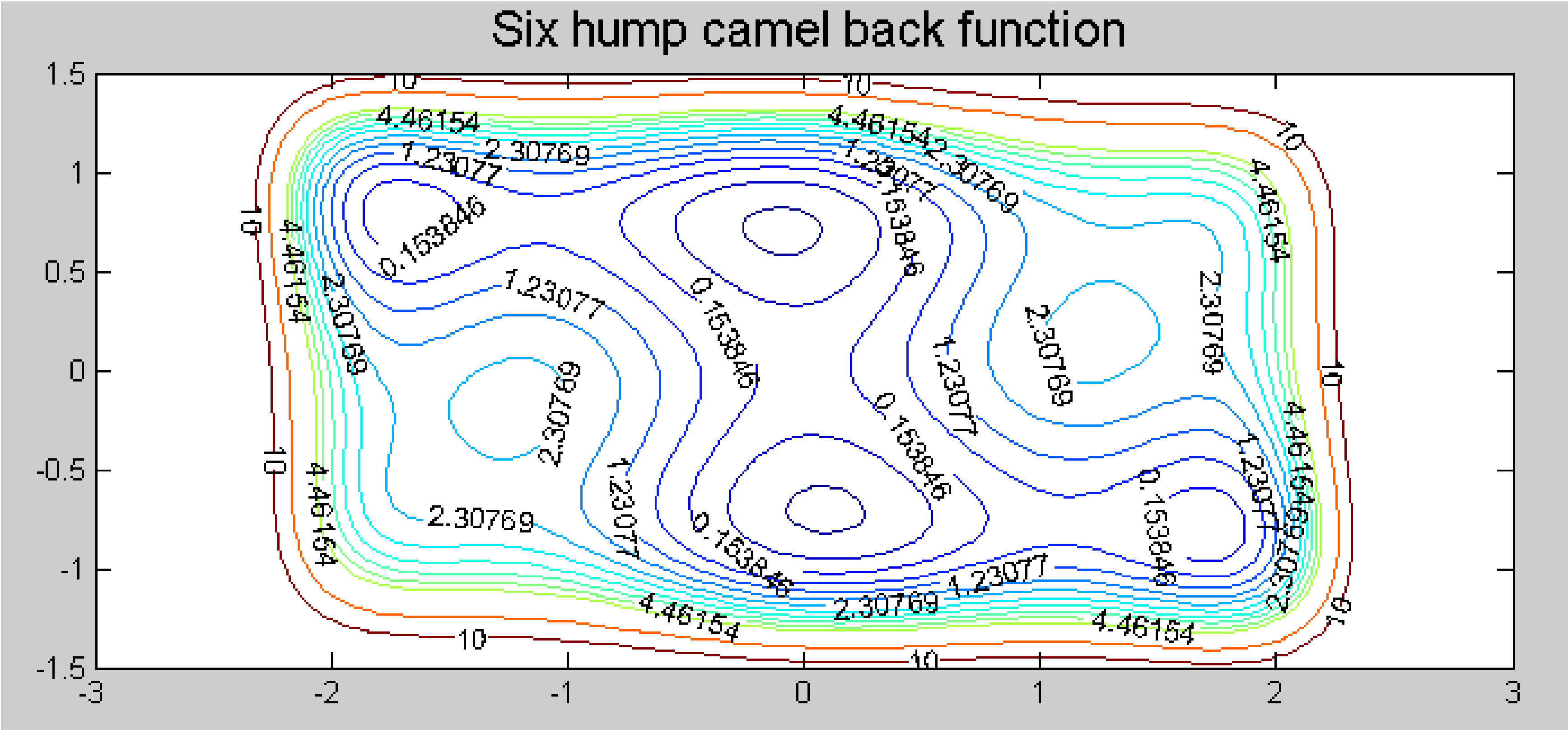
[excontour]

```
>> ezcontour('sin(3*y-x^2+1)+cos(2*y^2-2*x)', [-2,2,-1,1]);
```



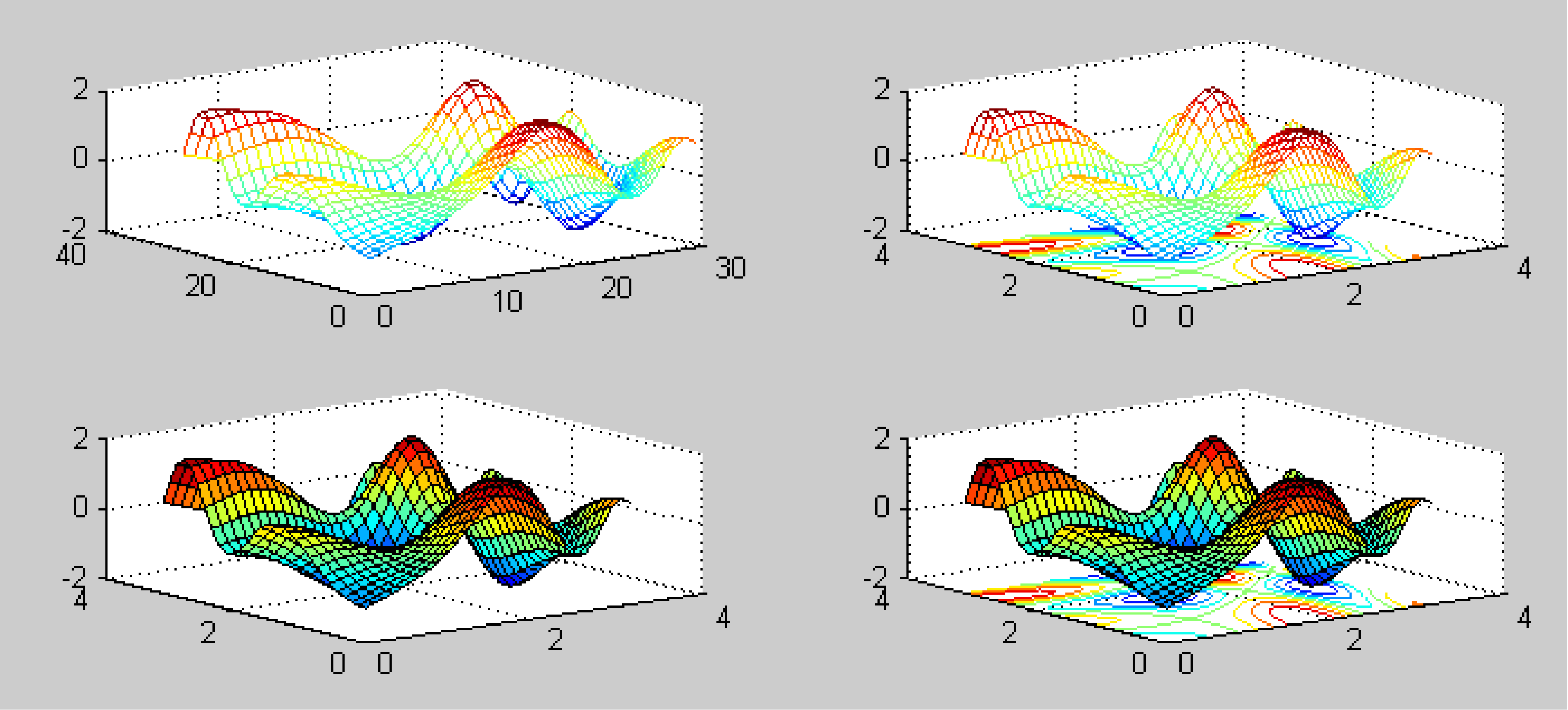
[contour]

```
>> x = linspace(-3, 3, 100);
>> y = linspace(-1.5, 1.5, 100);
>> [x, y] = meshgrid(x, y);
>> z = 4*x.^2 - 2.1*x.^4 + x.^6/3 + x.*y - 4*y.^2 + 4*y.^4;
>> cvals = [ linspace(-2, 5, 14)  linspace(5, 10, 3) ];
>> [C, h] = contour(x, y, z, cvals);
>> clabel( C, h, cvals([3 5 7 9 13 17]) )
>> title(' Six hump camel back function', 'fontsize', 16)
```



[mesh & surf]

```
>> x = linspace(0, pi, 30);   y = x;
>> [x, y] = meshgrid(x, y);
>> z = sin(y.^2+x) - cos(y-x.^2);
>> subplot(221);  mesh(z)
>> subplot(222);  meshc(x, y, z)
>> subplot(223);  surf(x, y, z);
>> subplot(224);  surfc(x, y, z);
```



< Symbolic Meth Toolbox >

[solve & subs]

```
>> syms  a b c x
>> y = solve( a*x^2+b*x+c )
   % y = solve( ' a*x^2+b*x+c = 0 ' )

>> subs(y, {a, b, c}, {1, 1, -1} )


>> syms x y
>> [x, y] = solve( 'x^2+y^2=1', 'x^3-y^3=1' )


>> S = solve( 'y=1/(1+x^2)', 'y=1.001-0.5*x' )
>> [ S.x(1)   S.y(1) ]


>> syms  p x y
>> y = ( (x^p)^(p+1) )/x^(p-1);
>> simplify(y)
   =>  (x^p)^p*x
```

[int & pretty & double]

```
>> int('x')
>> a = int( 'sqrt(tan(x))' )
>> pretty(a)

>> a = int('arctan(x)/x^(3/2)', 0, 1)
>> double(a)     % Numeric form
```

[diff & factor]

```
>> syms  a  x  n
>> diff( x^2 )       % diff(x^2, x)

>> a = diff( x^n, 2 )
>> factor(a)

>> diff( sin(x)*exp(-a*x^2) )

>> diff( x^4*exp(x),  3 )
```

[dsolve & Dy & D2y]

```
y'(t) = c y(t) - b y^2(t)
Dy = c*y - b*y^2          % Dy = y',   D2y = y''

>> syms  b  c  y  t
>> y = dsolve( ' Dy = c*y - b*y^2 ' )

>> y = dsolve( ' Dy = 10*y - y^2 ', ' y(0) = 0.01 ' )

>> subs( y, t, 0 )

>> res = diff( y, t ) - (10*y-y^2)

>> simplify( res )

>> y = dsolve( ' D2y + y = 0 ')

>> y = dsolve( ' D2y + y = 0 ', ' y(0)=0 ', ' Dy(0) = 1 ' )
```