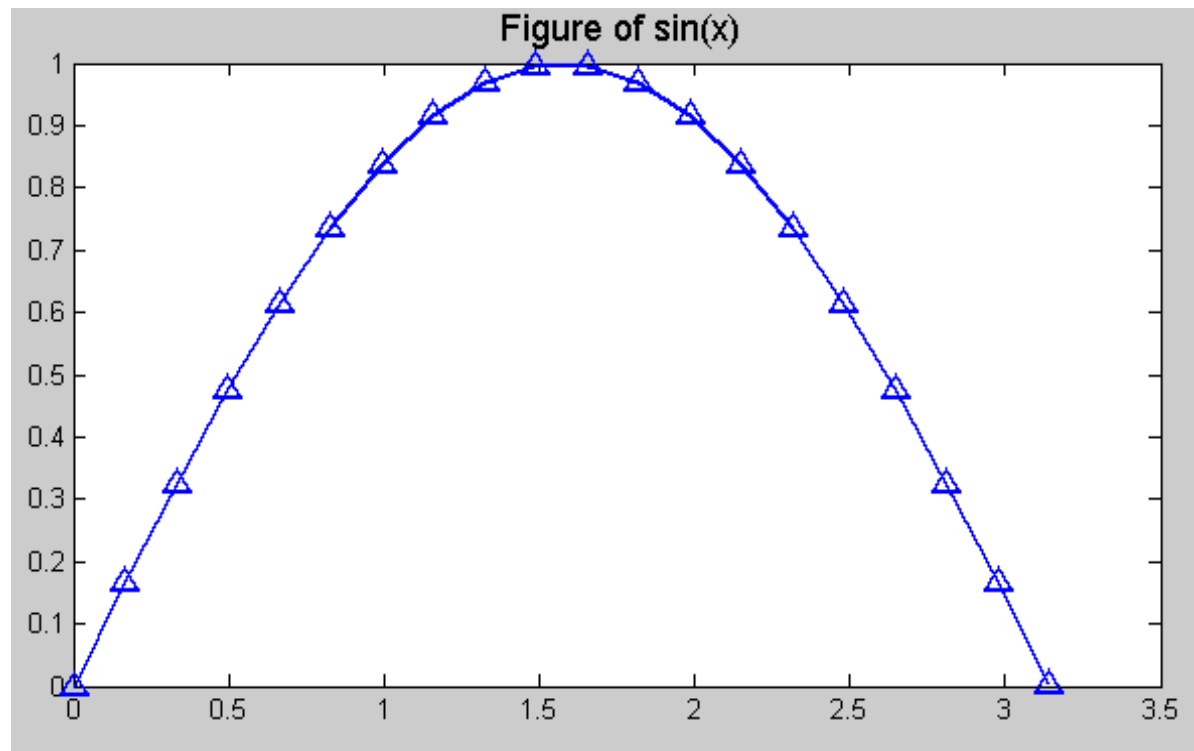


## < Graphics in Matlab >

### [ 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

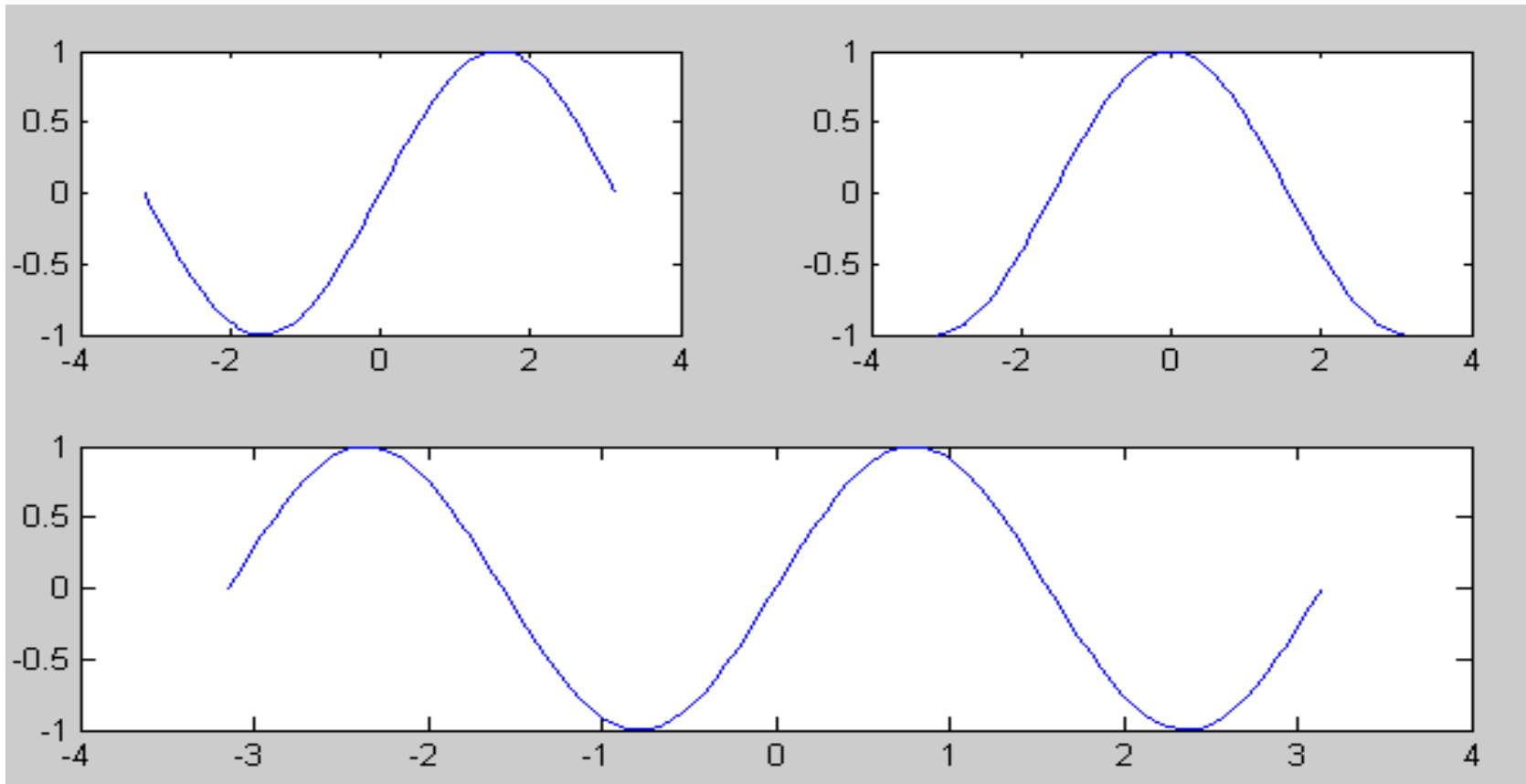
text gtext

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) )
```

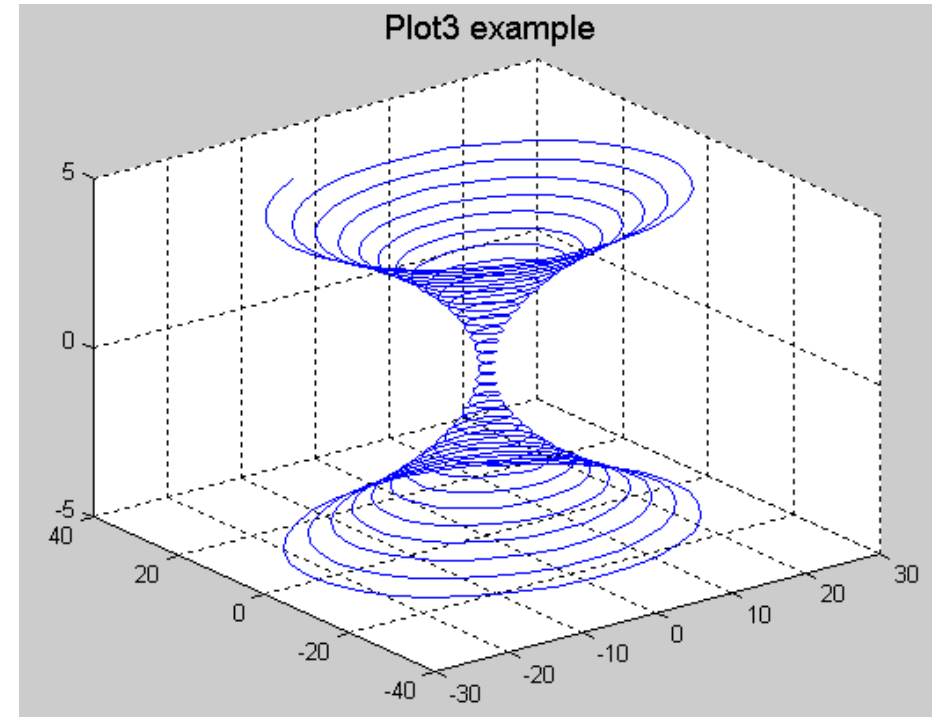
```
>> fplot( 'sin', [-3,3] )  
>> fplot( @cos, [-3,3] )
```



## < 3D Graphics in Matlab >

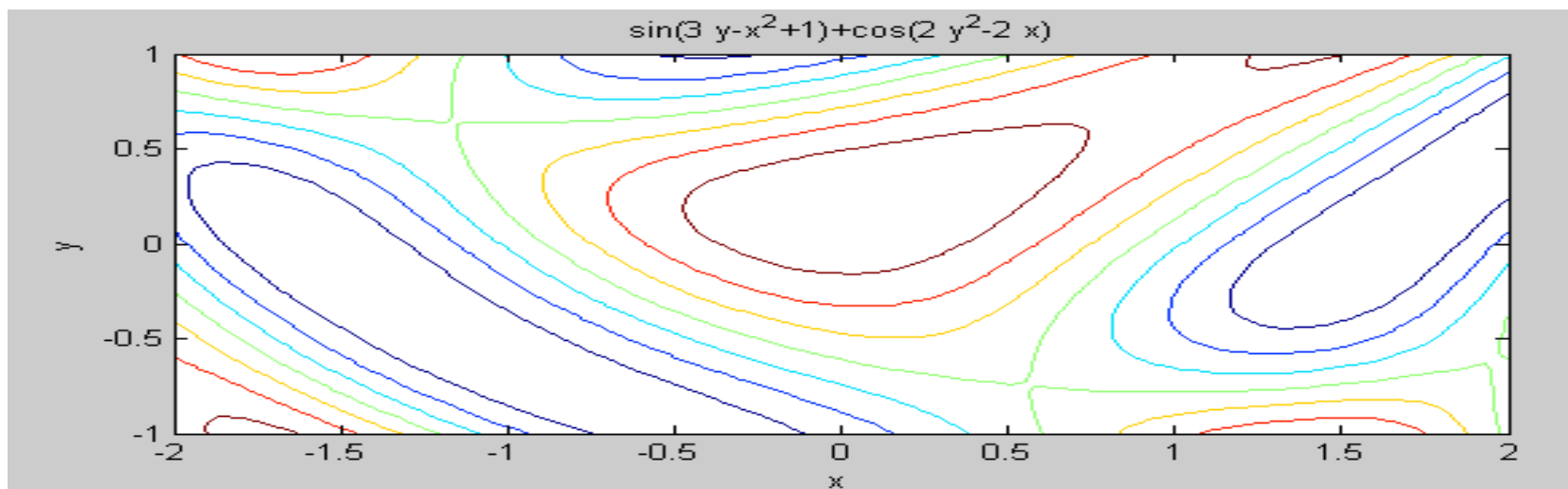
### [ plot3 ]

```
>> 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)
```



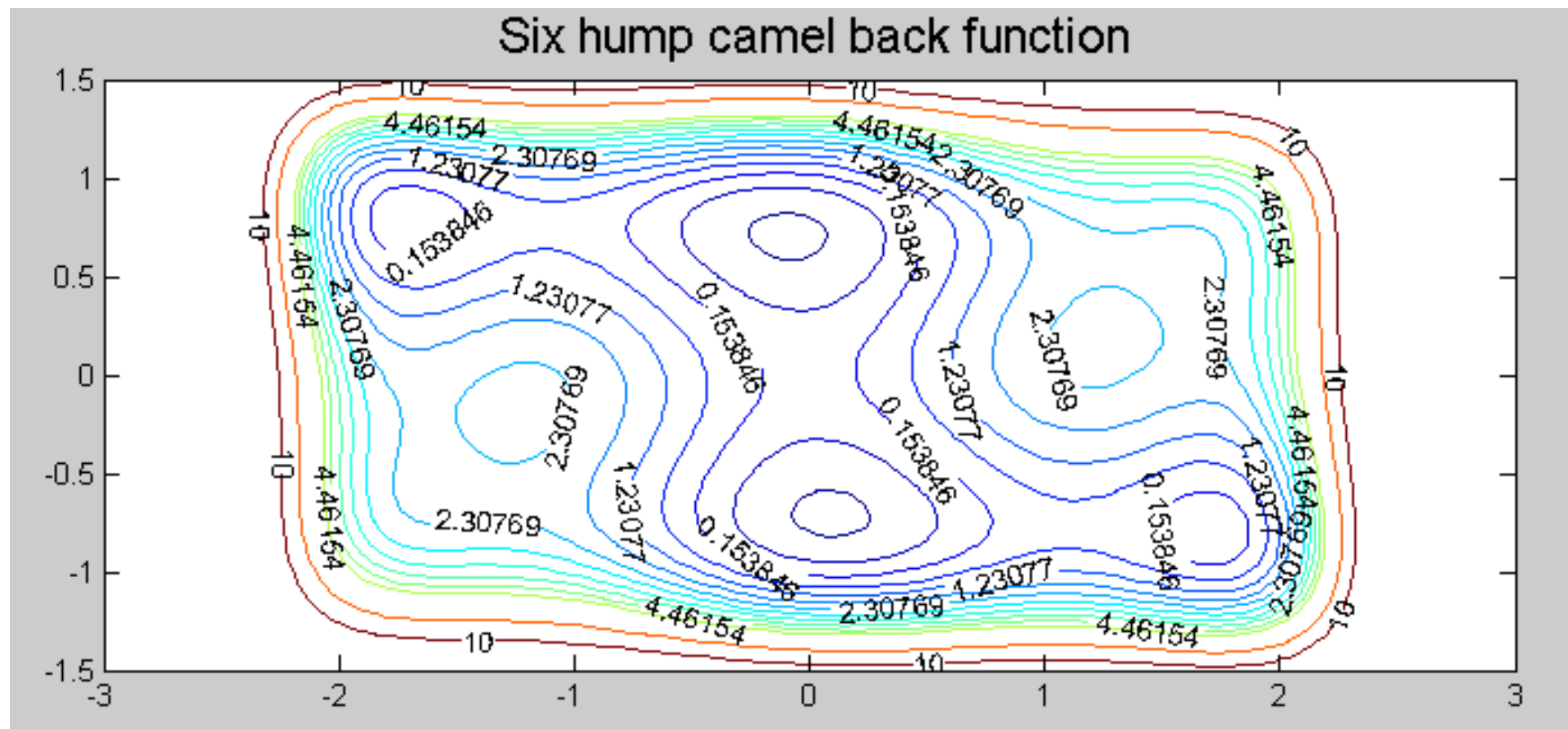
### [ ezcontour ]

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



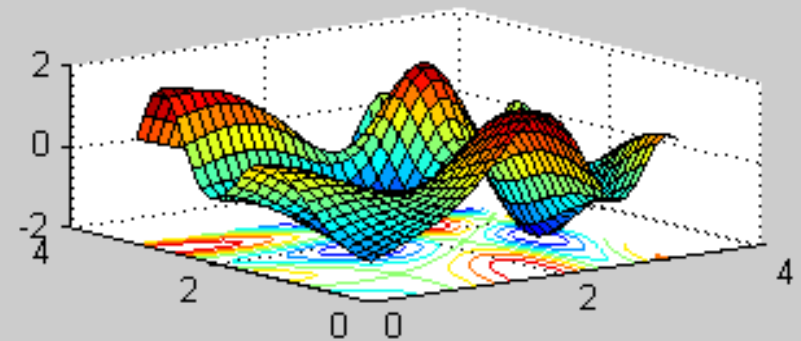
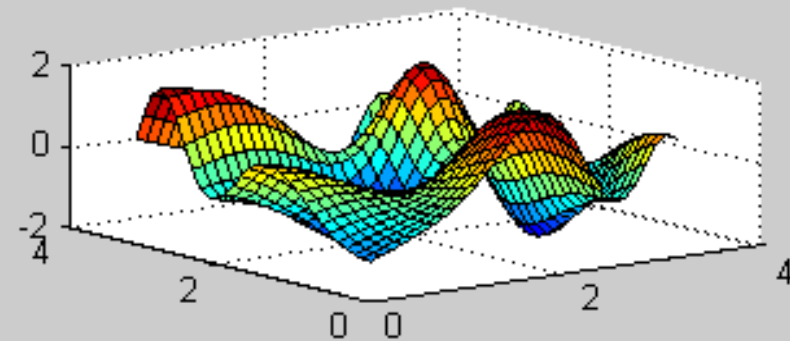
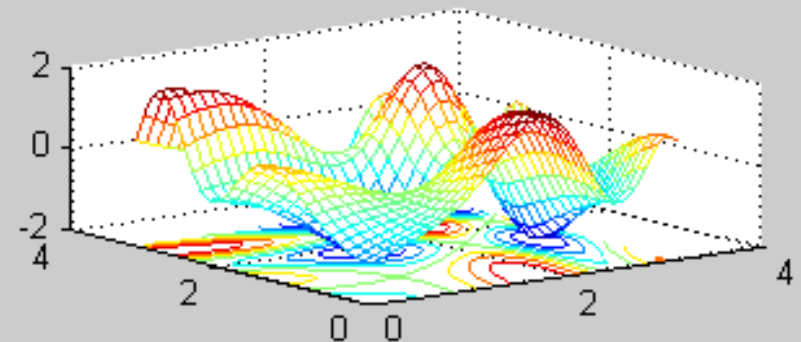
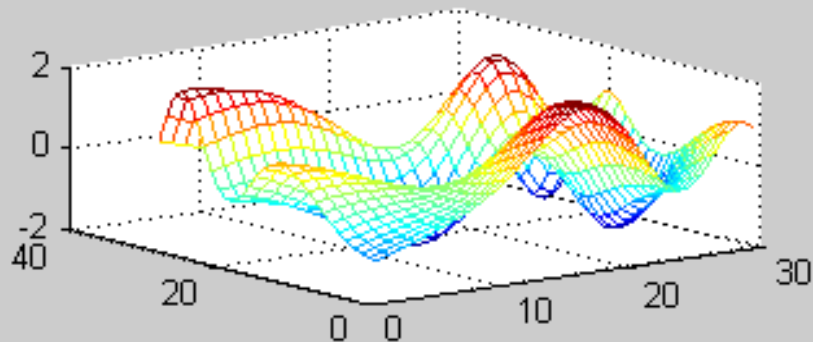
[ contour ]

```
>> 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 ]

$$y'(t) = c y(t) - b y^2(t)$$

$$Dy = c*y - b*y^2 \quad \% Dy = y', \quad D2y = y''$$

```
>> 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 ' )
```