

# 求解方程与方程组

## 求解简单方程

```
syms x
answ = solve(sin(x) == 1, x)
```

answ =

$$\frac{\pi}{2}$$

## 获得周期函数所有解

```
syms x
eqn = (sin(x) == 1);
% answ = solve(eqn, x)
[answ, params, conditions] = solve(eqn, x, "ReturnConditions", true)
```

answ =

$$\frac{\pi}{2} + 2\pi k$$

params =  $k$

conditions =  $k \in \mathbb{Z}$

## 求解方程组

```
syms u v a
eqn = [2*u + v == a, u - v == 1];
answ = solve(eqn, [u, v]);
answ
```

answ = 包含以下字段的 struct:

u: [1×1 sym]

v: [1×1 sym]

answ.u, answ.v

ans =

$$\frac{a}{3} + \frac{1}{3}$$

ans =

$$\frac{a}{3} - \frac{2}{3}$$

## vpasolve 求解函数(数值解)

```
syms x y
eqn = [x^2 - 2*x - 3*x*y == 10, y^4 == exp(-2*x/3)] % Matlab 对空格敏感(可用于分割数组)
```

eqn =

$$\left(x^2 - 3xy - 2x = 10 \quad y^4 = e^{-\frac{2x}{3}}\right)$$

```
answ = vpasolve(eqn, [x,y], [0, 0])
```

answ = 包含以下字段的 struct:

```
x: [1x1 sym]
y: [1x1 sym]
```

```
answ.x, answ.y
```

```
ans = -1.393259627845404026653388391876
```

```
ans = 1.261384513542676943005039668231
```

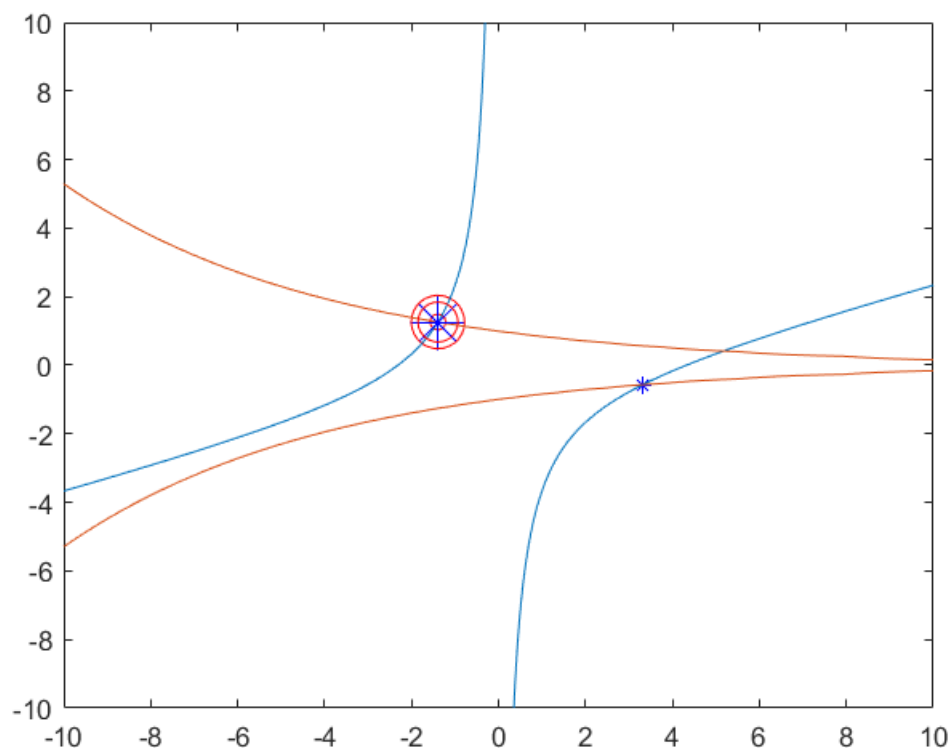
```
answ2 = vpasolve(eqn, [x,y], 'Random', true)
```

answ2 = 包含以下字段的 struct:

```
x: [1x1 sym]
y: [1x1 sym]
```

% 作图

```
fimplicit(x^2-2*x-3*x*y == 10, [-10, 10]);
hold on;
fimplicit(y^4 == exp(-2*x/3), [-10, 10])
hold on
plot(answ.x, answ.y, 'ro', 'MarkerSize', 15);
hold on;
plot(answ2.x, answ2.y, 'b*', 'MarkerSize', 10);
```



## fsolve 函数求解

```
answ3 = fsolve(@myfun, [0, 0]);
```

No solution found.

fsolve stopped because the problem appears regular as measured by the gradient,  
but the vector of function values is not near zero as measured by the  
value of the function tolerance.

<stopping criteria details>

```
answ3
```

```
answ3 = 1×2  
        0    0.6686
```

```
function myF = myfun(X)  
    myF(1) = X(1)^2 + 2 - sqrt(X(2)^3);  
    myF(2) = X(1)^3 - exp(X(2)^4);  
end
```