This is all about symbolic variables

```
syms x;
y = x ^ 2;
y
```

y = x^2

```
solve(y - 1 == 0)
```

ans =

$$\begin{pmatrix} -1 \\ 1 \end{pmatrix}$$

```
solve(x^2 - 2*x + 1)
```

ans =

$$\begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

```
solve(x^2 - 2*x - 5)
```

ans =

$$\begin{pmatrix} 1-\sqrt{6} \\ \sqrt{6}+1 \end{pmatrix}$$

```
solve(x^2 - 4*x + 4)
```

ans =

$$\begin{pmatrix} 2 \\ 2 \end{pmatrix}$$

```
% we can also use 'single quotes'
solve(x^2-2*x+1==0)
```

ans =

$$\begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

```
syms x y;
z = (x + y) * (x - y);
z
```

z = $(x+y)\,(x-y)$

```

solve(z == 10)
```

ans =

$$\begin{pmatrix} \sqrt{y^2+10} \\ -\sqrt{y^2+10} \end{pmatrix}$$

```
expand(z)
```

ans = $x^2 - y^2$

```
factor(ans)
```

ans = $(x - y \quad x + y)$

```
z = (x^3-y^3)/(x-y);
simplify(z)
```

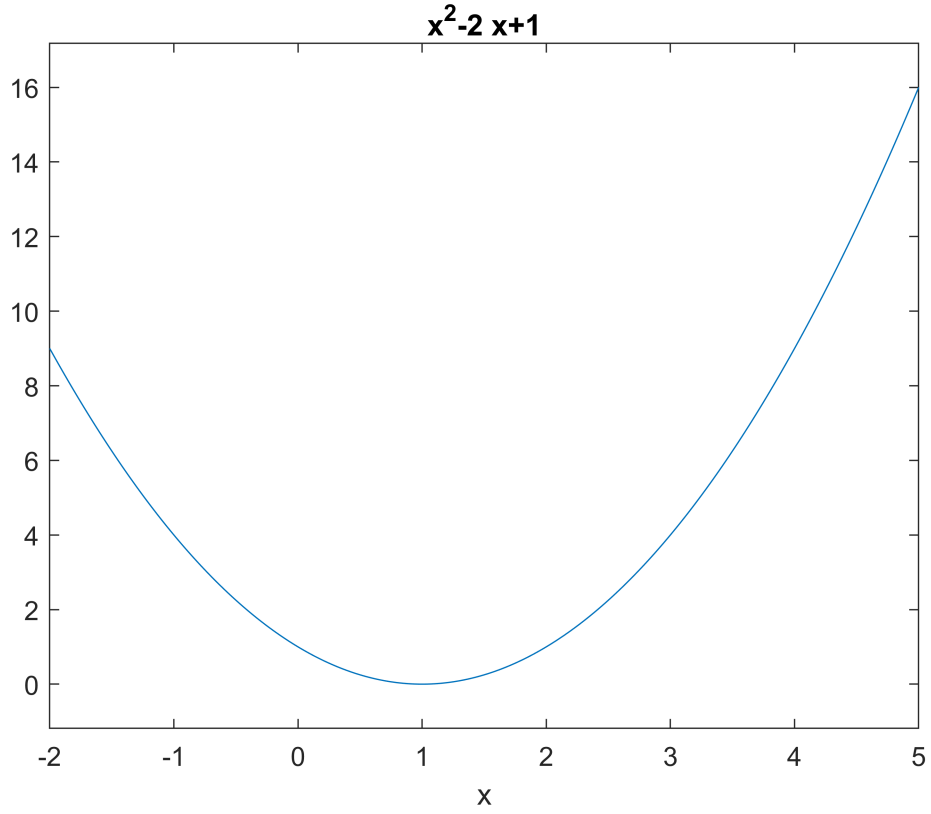
ans = $x^2 + x\,y + y^2$

```
z = (x^3-y^3)/(x-y)
```

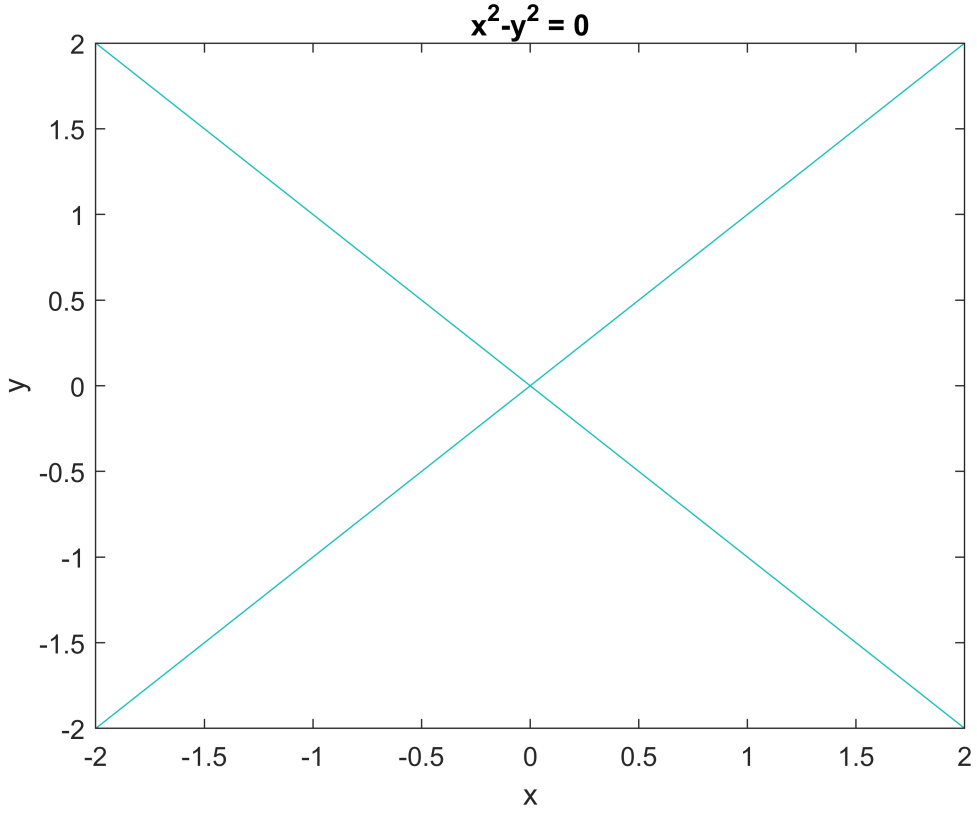
z =

$$\frac{x^3 - y^3}{x - y}$$

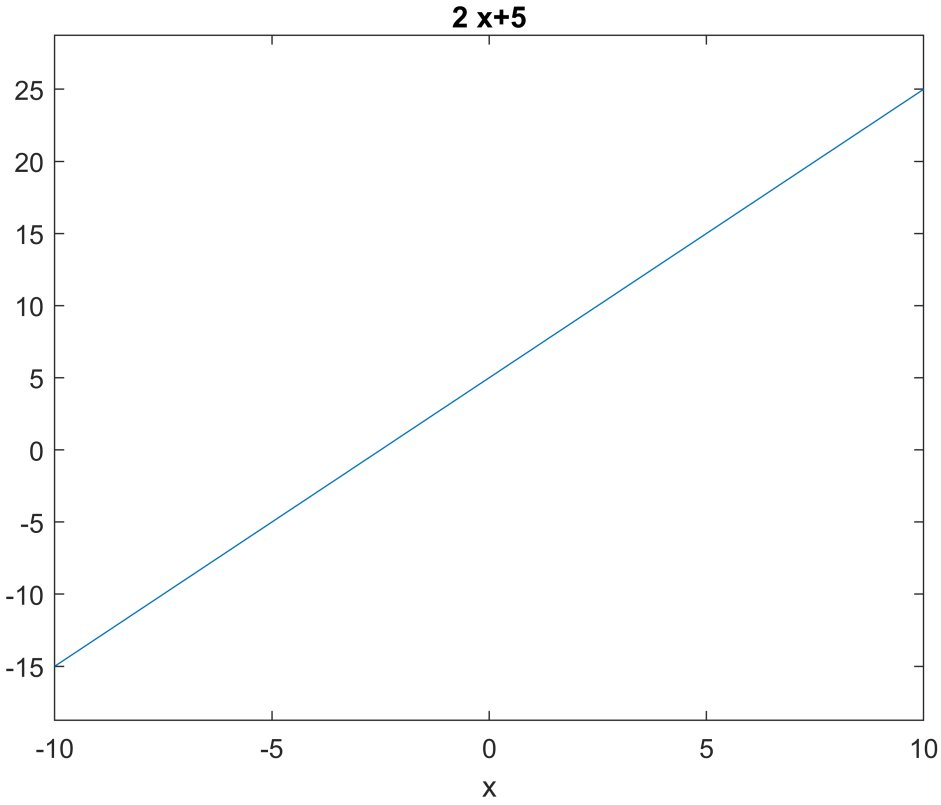
```
% plotting the graph of f(x) using ezplot(f(x), [lower higher])
ezplot('x^2-2*x+1', [-2 5]);
```



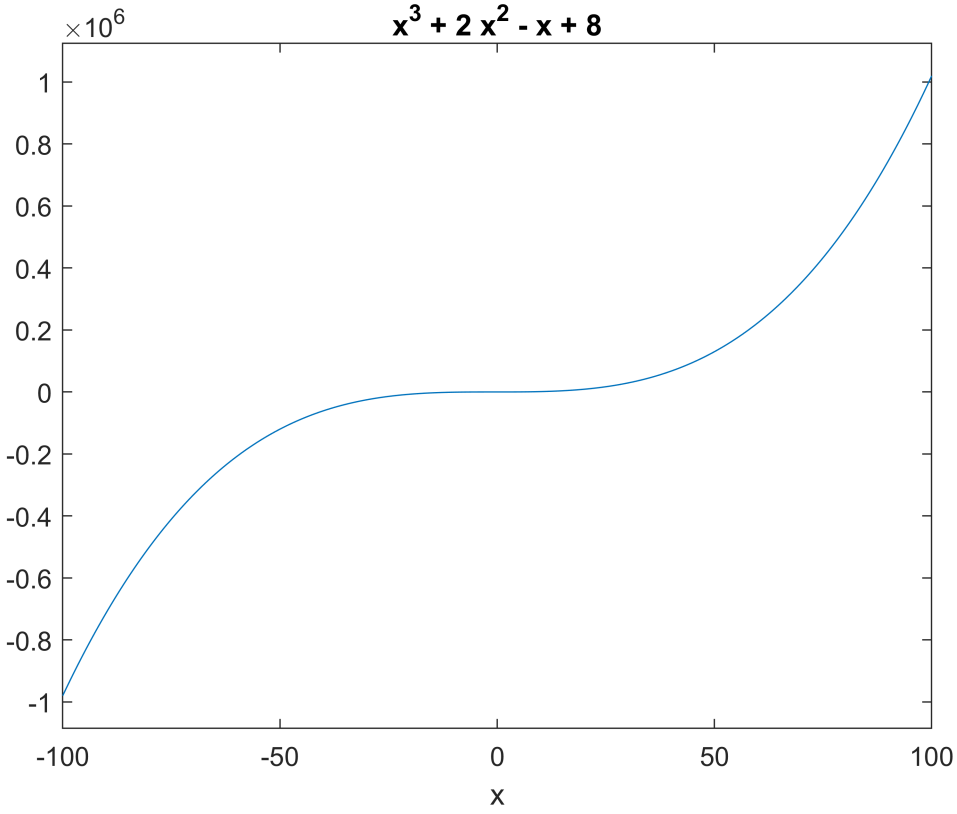

```
ezplot('x^2-y^2', [-2 2])
```



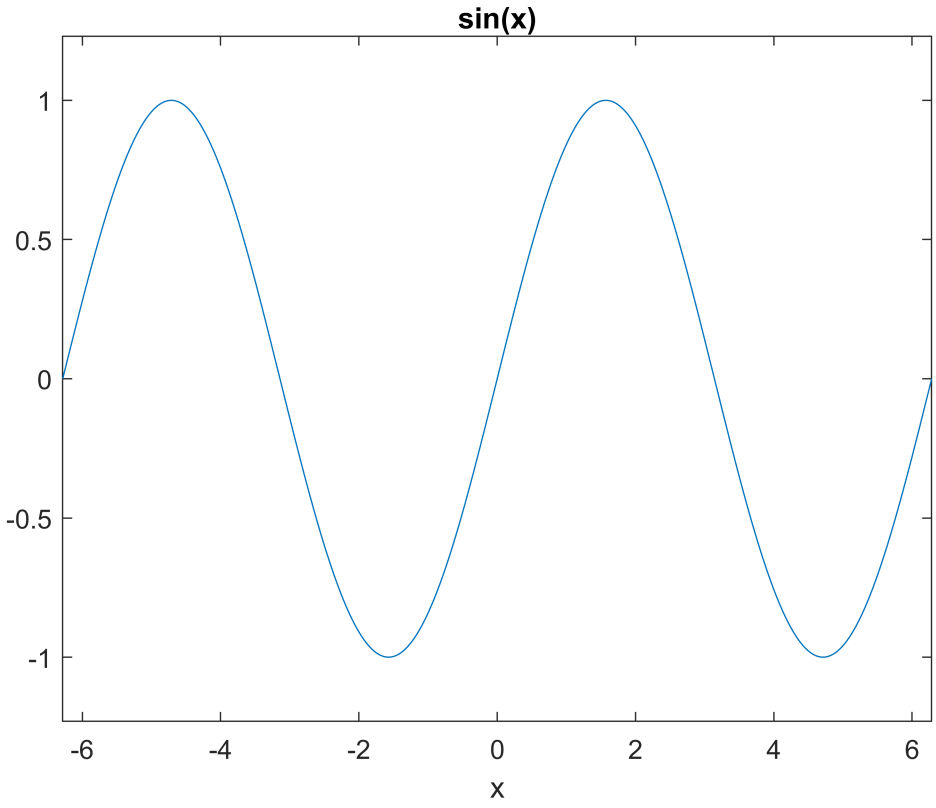

```
ezplot('2*x+5', [-10 10])
```



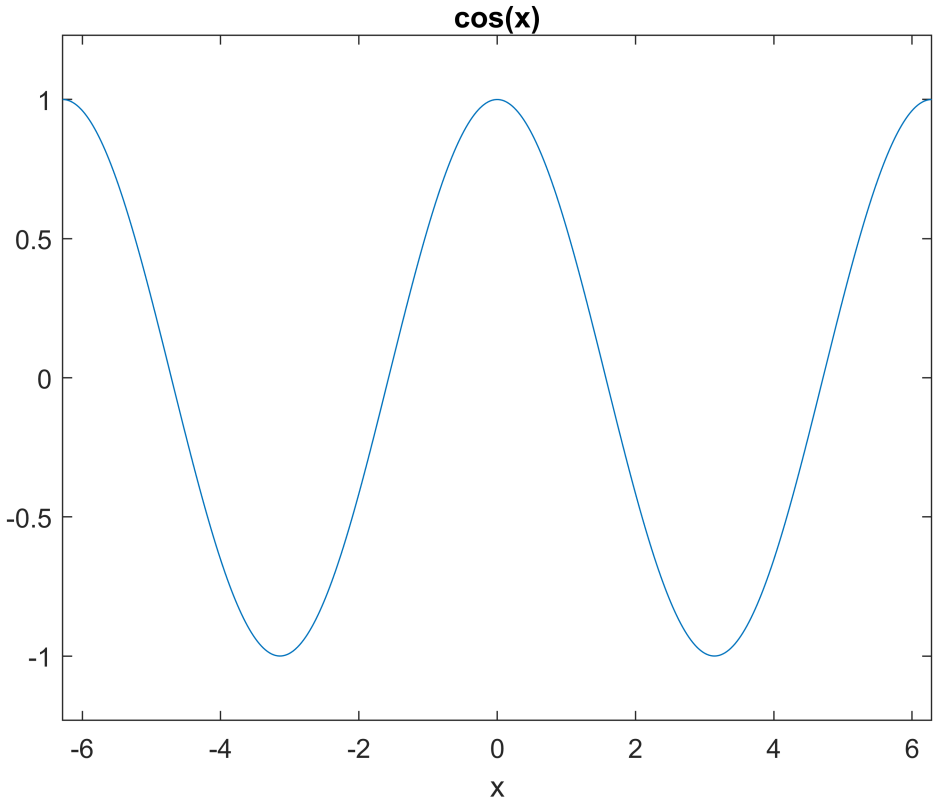
```
ezplot('x^3 + 2*x^2 - x + 8', [-100 100])
```




```
ezplot(sin(x))
```

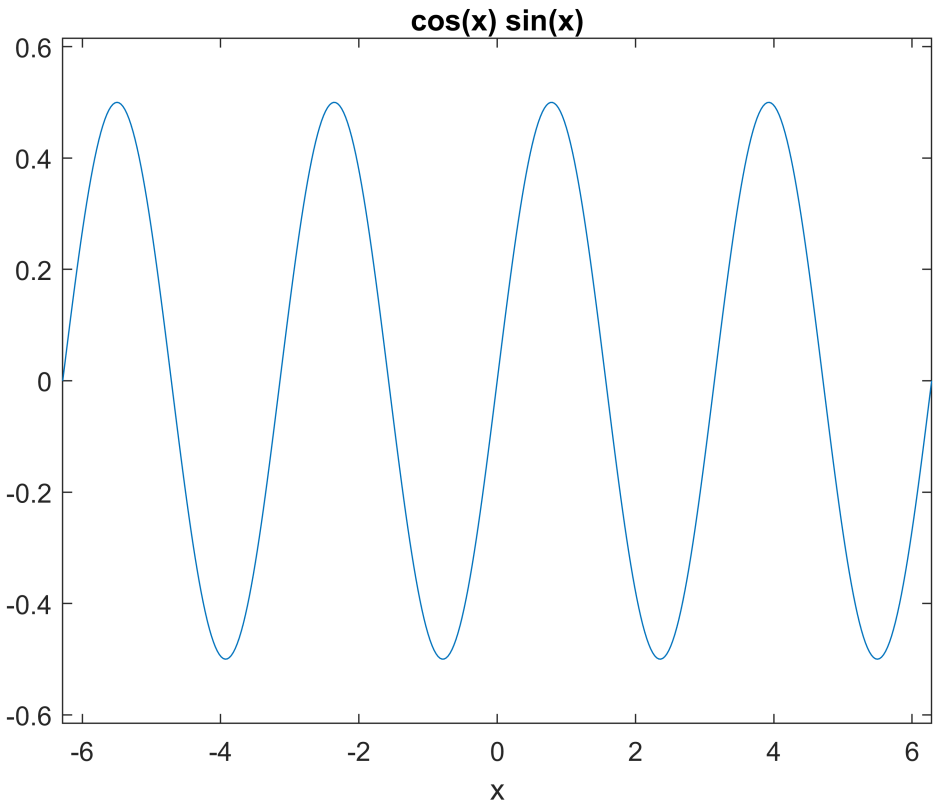



```
ezplot(cos(x))
```

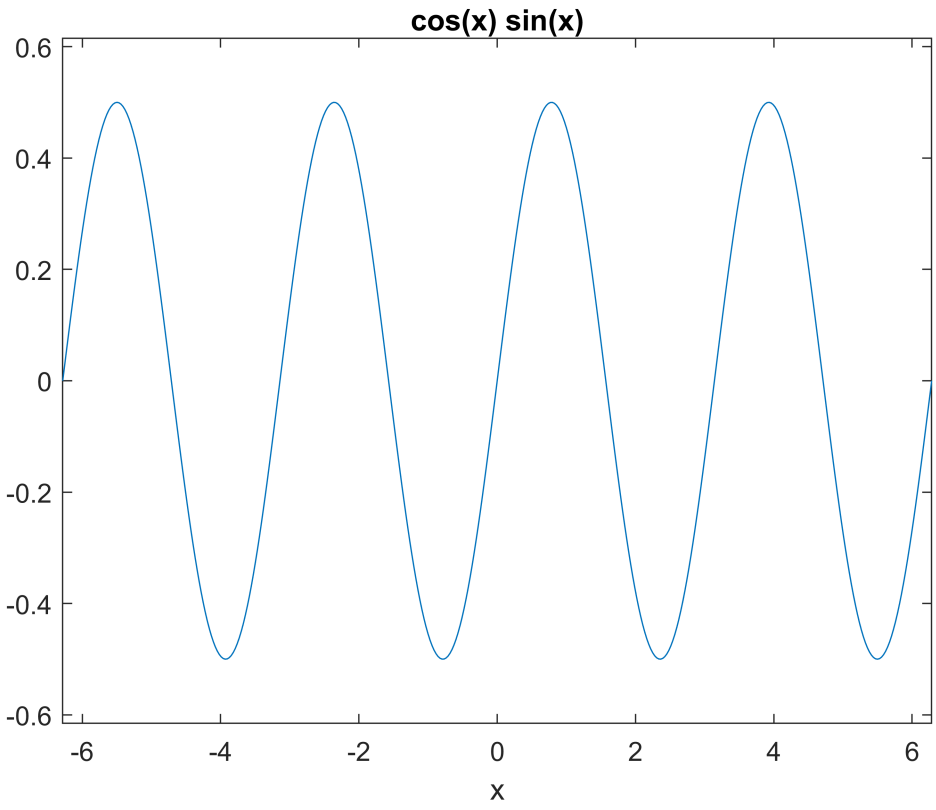



```
z = sin(x) * cos(x);
```

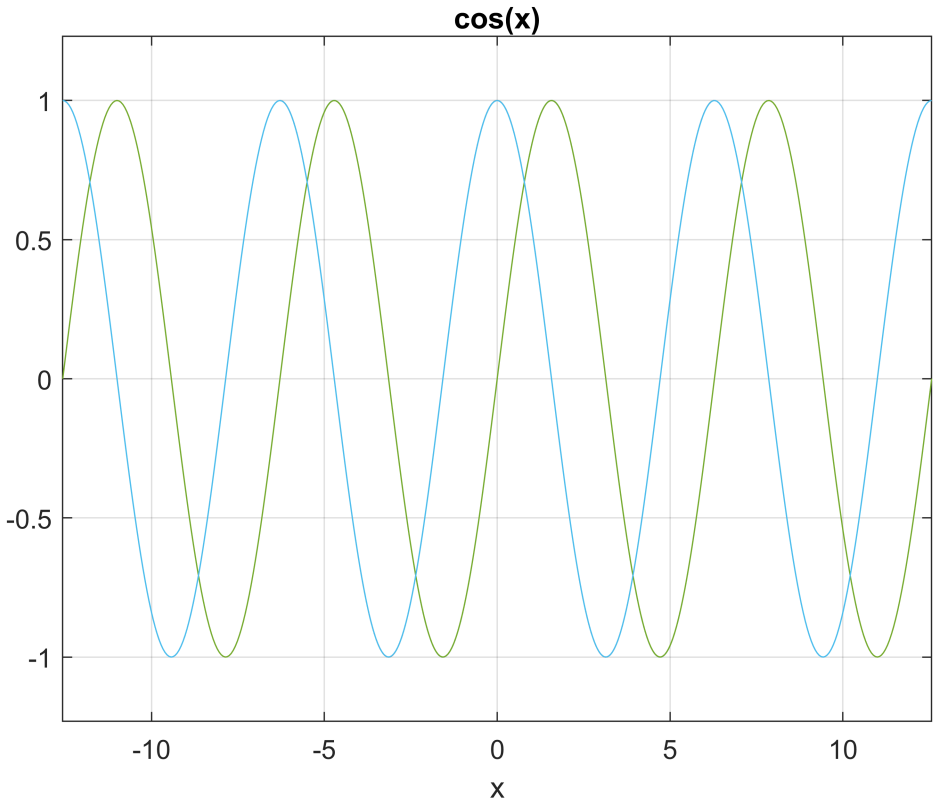
```
lower = -2*pi;
higher = 2*pi;
ezplot(z, [lower higher]);
```




```
% we can compose functions
z = sin(x) * cos(x);
lower = -2*pi;
higher = 2*pi;
ezplot(z, [lower higher]);
```




```
% plotting one over another
f1 = sin(x);
f2 = cos(x);
lower = -4*pi;
higher = 4*pi;
ezplot(f1, [lower, higher]);
hold on;
grid on;
ezplot(f2, [lower higher]);
```




```
% use of substitute
z = sin(x);
subs(z, x, 2);
ans
```

ans = $\sin(2)$

```
subs(sin(x), x, 2*pi)
```

ans = 0

```
subs(x^2, x, 8)
```

ans = 64

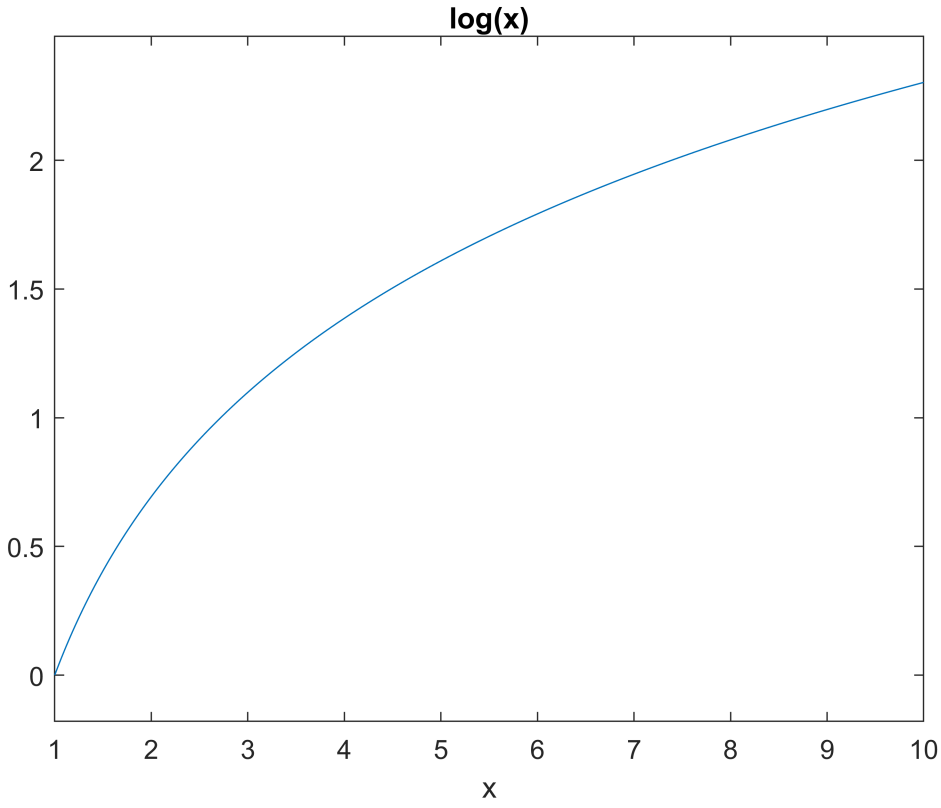
```
subs(x^3-y^3, x, 2)
```

ans = $8 - y^3$

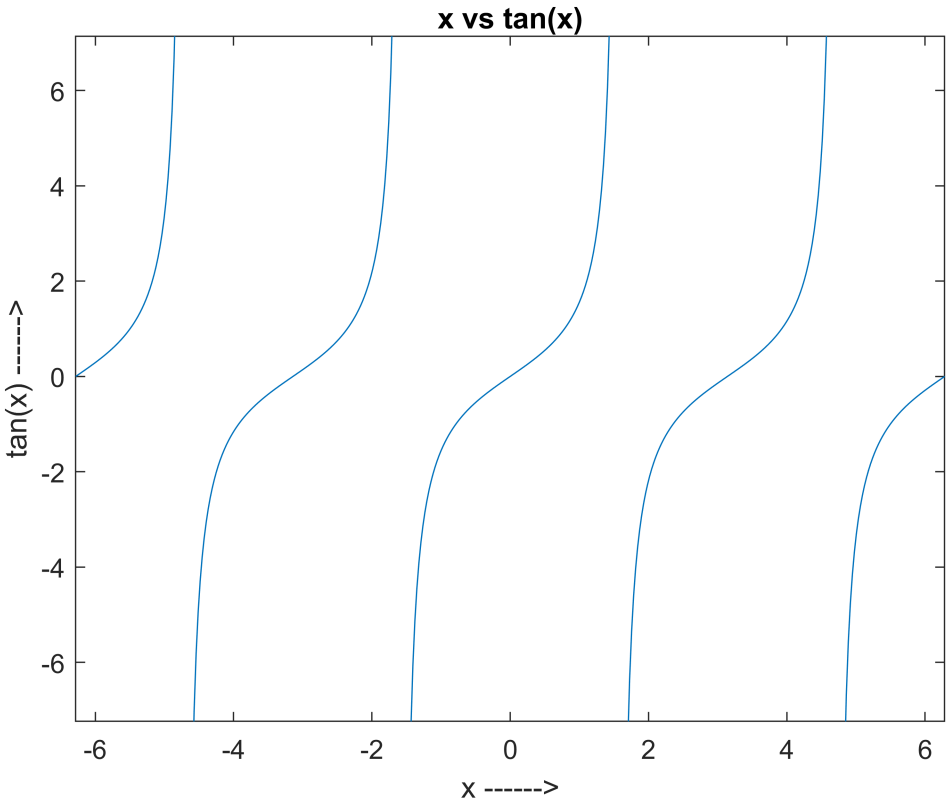
```
subs(ans, y, 4)
```

ans = -56

```
% plot the graph of log(x) using ezplot()
close all;
ezplot('log(x)', [1, 10])
```




```
% plot tan(x) using ezplot()
ezplot(tan(x), [-2*pi 2*pi]);
xlabel("x ------>");
ylabel("tan(x) ------>");
title("x vs tan(x)");
```




```
% what is the value of cos(x) at x = pi/2
f = cos(x);
v = subs(f, x, pi/2)
```

```
v = 0
```