

How to use MATLAB or FREEMAT to find the Roots of a Polynomial

To find the roots of an nth-order polynomial

$$p(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

use the following code:

```
a = [a_n a_{n-1} ... a_1 a_0];  
roots(a)
```

Example 1:

$$p(x) = x^2 - 2x - 3$$

has two real roots. They may be determined as follows:

```
a = [1 -2 -3];  
roots(a)
```

```
ans =  
    3  
   -1
```

Example 2:

$$p(x) = 3x^5 - 2x^4 + x^3 + 2x^2 - 1$$

has five roots; one is real and the other four occur in two complex-conjugate pairs. They may be determined as follows:

```
a = [3 -2 1 2 0 -1];  
roots(a)
```

```
ans =  
    0.5911 + 0.9284i  
    0.5911 - 0.9284i  
   -0.5694 + 0.3423i  
   -0.5694 - 0.3423i  
    0.6234 + 0.0000i
```