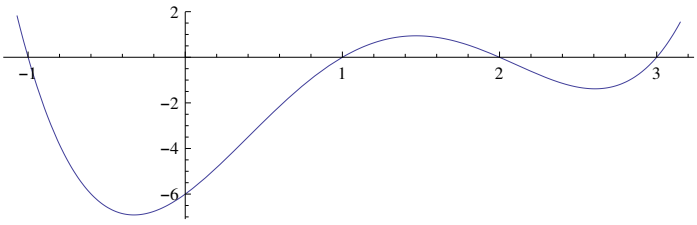
Solving equation

$x^4 - 5x^3 + 5x^2 + 5x - 6 = 0$

```
Plot[x^4 - 5 x^3 + 5 x^2 + 5 x - 6, {x, -1.07, 3.15
 }, AspectRatio → .3]
```



Guess a solution x = -1.

Divide the polynomial by x - (-1)

```
Simplify[(x^4 - 5 x^3 + 5 x^2 + 5 x - 6) / (x - (-1))]
```

$-6 + 11x - 6x^2 + x^3$

Guess a solution x = 1

Divide the polynomial by x - 1

$$\text{Simplify}\left[\frac{-6 + 11x - 6x^2 + x^3}{x - 1}\right]$$

$6 - 5x + x^2$

Solve the equation $6 - 5x + x^2 = 0$

```
Solve[6 - 5 x + x^2 == 0]
```

{{x → 2}, {x → 3}}

Or just solve the original equation in one step (if you can)

```
Solve[x^4 - 5 x^3 + 5 x^2 + 5 x - 6 == 0]
```

{{x → -1}, {x → 1}, {x → 2}, {x → 3}}

Here are some invalid "solutions"

```
(-1)^4 - 5 (1)^3 + 5 (2)^2 + 5 (3) - 6
```

25

```
(1)^4 - 5 (2)^3 + 5 (3)^2 + 5 (-1) - 6
```

-5

```
(1)^4 - 5 (2)^3 + 5 (3)^2 + 5 (0) - 6
```

0

$$(0)^4 - 5\,(0)^3 + 5\,(0)^2 + 5\left(\frac{6}{5}\right) - 6$$

0