

```
> p := 11;
```

$$p := 11$$

```
> f := x^8+7*x^7+10*x^6+7*x^5+x^4+3*x^3+3*x^2+3*x+5;
```

$$f := x^8 + 7x^7 + 10x^6 + 7x^5 + x^4 + 3x^3 + 3x^2 + 3x + 5$$

```
> Gcd(f, diff(f,x)) mod p;
```

$$1$$

```
> g := Gcd( f, x^11-x ) mod p;
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$$g := x^5 + 7x^4 + 9x^3 + 7x^2 + 8x + 4$$

```
> h := Quo( f, g, x ) mod p;
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$$h := x^3 + x + 4$$

Note  $h$  is irreducible

```
> for alpha from 0 to p-1 do Gcd(g,(x+alpha)^5+1) mod p od;
```

$$x^3 + 4x^2 + 4x + 1$$

$$x^2 + 8$$

$$x^2 + 8$$

$$x^3 + 4x^2 + 7x + 4$$

$$x^3 + 3x + 8$$

$$x^3 + x^2 + 9x + 3$$

$$x + 9$$

$$x^3 + 3x^2 + 9x + 7$$

$$x^3 + 5x^2 + 3x + 10$$

$$x + 1$$

$$x + 8$$

```
> g1 := Gcd(g,(x-0)^5+1,'g2') mod p; g2;
```

$$g1 := x^3 + 4x^2 + 4x + 1$$

$$x^2 + 3x + 4$$

```
> seq( Gcd(g1,(x-alpha)^5+1) mod p, alpha=0..p-1 );
```

$$x^3 + 4x^2 + 4x + 1, 1, x + 1, x^2 + 10x + 9, x^2 + 6x + 5, x + 9, x + 9, x^2 + 3x + 1, x + 1, x + 5, x + 5$$

```
> seq( Gcd(g2,(x-alpha)^5+1) mod p, alpha=0..p-1 );
```

$$1, x + 8, 1, x + 6, x + 8, 1, x^2 + 3x + 4, x + 8, x^2 + 3x + 4, x + 6, x + 6$$