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## Chebyshev interpolation

KZ

```
chebyshev[fun_, x0_, m_, a_] := Module[{x = x0, array = {x0}, iter, der1, der2},
  der1 = N@D[fun[y], y] /. y -> x;
  der2 = N@D[fun[y], {y, 2}] /. y -> x;
  Do[
    If[Abs@fun[x] < a, Break[],
      x = x -  $\frac{\text{fun}[x]}{\text{der1}} - \frac{(\text{fun}[x])^2 \text{der2}}{2 \text{der1}^3}$ ; AppendTo[array, x]; iter = i,
    {i, 1, m}];
  {x, iter}]
```

### Test 1

```
fun[x_] := ex - 5
```

```
chebyshev[fun, 2, 10, 0.0001]
```

```
{1.60945, 7}
```

```
Log[5] // N
```

```
1.60944
```

### Test 2

```
fun1[x_] := x3 + 6 x2 + 9 x - 4
```

```
chebyshev[fun1, 1, 10, 0.001]
```

```
{0.355358, 9}
```

```
Solve[x3 + 6 x2 + 9 x - 4 == 0, x]
```

```
{ {x -> 0.355...}, {x -> -3.18... - 1.08... i}, {x -> -3.18... + 1.08... i} }
```