```
f1[x_] := x^3 + 4 x^2 - 10
```

```
f[x_] := x + x^3 + 4 x^2 - 10
FindRoot[f1[x] == 0, {x, 4.1}]
Solve[f1[x] == 0, x] // N
```

```
{x → 1.36523}
```

```
{{x → 1.36523}, {x → -2.68262 + 0.358259 i}, {x → -2.68262 - 0.358259 i}}
```

```
x0 = 1.5;
x1 = x0 + x0^3 + 4 x0^2 - 10
x2 = x1 + x1^3 + 4 x1^2 - 10
x3 = x2 + x2^3 + 4 x2^2 - 10
x4 = x3 + x3^3 + 4 x3^2 - 10
x5 = x4 + x4^3 + 4 x4^2 - 10
x6 = x5 + x5^3 + 4 x5^2 - 10
x7 = x6 + x6^3 + 4 x6^2 - 10
```

```
f2[x_] := x + x^3 + 4 x^2 - 10
x0 = 1.5;
x1 = f2[x0]
x2 = f2[x1]
x3 = f2[x2]
x4 = f2[x3]
x5 = f2[x4]
x6 = f2[x5]
x7 = f2[x6]
```

```
f2[x_] := 0.5 (10 - x^3)^(1/2)
x0 = 1.5;
x1 = f2[x0]
x2 = f2[x1]
x3 = f2[x2]
x4 = f2[x3]
x5 = f2[x4]
x6 = f2[x5]
x7 = f2[x6]
x8 = f2[x7]
```

```
1.5
```

```
?? Do
```

Do[*expr*, {i_{max}}] evaluates *expr* i_{max} times.
Do[*expr*, {*i*, i_{max}}] evaluates *expr* with the variable *i* successively taking on the values 1 through i_{max} (in steps of 1).
Do[*expr*, {*i*, i_{min}, i_{max}}] starts with $i = i_{min}$.
Do[*expr*, {*i*, i_{min}, i_{max}, *di*}] uses steps *di*.
Do[*expr*, {*i*, {i_1, i_2, …}}] uses the successive values i_1, i_2, ….
Do[*expr*, {*i*, i_{min}, i_{max}}, {*j*, j_{min}, j_{max}}, …] evaluates *expr* looping over different values of *j*, etc. for each *i*. ≫

```
Attributes[Do] = {HoldAll, Protected}
```

```
f2[x_] := 0.5 (10 - x^3)^(1/2)
x = 1.5;
```

```
Do[{x = f2[x], y = x, Print[y]}, {15}]
```

```
1.5
1.286953768
1.402540804
1.345458374
1.375170253
1.360094193
1.367846968
1.363887004
1.365916734
1.364878217
1.365410062
1.365223680
1.365230236
1.365230006
1.365230013
```

```
1.28695

1.40254

1.34546

1.37517

1.36009

1.36785

1.36389

1.36592

1.36488

1.36541

1.36514

1.36528

1.36521

1.36524

1.36522
```

3.875

112.123

1.45995×10^{6}

3.11184×10^{18}

3.01336×10^{55}

2.73623×10^{166}

$2.048601286123474 \times 10^{499}$

```
y = 0;
Do[{x = y - f[y] / fd[y] // N, y = x, Print[y]}, 15]
```

1.

0.735759

0.694042

0.693148

0.693147

0.693147

0.693147

0.693147

0.693147

0.693147

0.693147

0.693147

0.693147

0.693147

0.693147

```
?? While
```

While[*test*, *body*] evaluates *test*, then *body*, repetitively, until *test* first fails to give True. ≫

```
Attributes[While] = {HoldAll, Protected}
```

```
y = 0; n = 1; While[n < 15, {x = y - f[y] / fd[y] // N, y = x, Print[y]}; n++]
```

```
1.
0.735759
0.694042
0.693148
0.693147
0.693147
0.693147
0.693147
0.693147
0.693147
0.693147
0.693147
0.693147
0.693147
```