

```
> Digits:=10;  
> u:=evalf(sqrt(2));  
f := h -> ((u+h)^4-(u-h)^4)/(2*h)-4*u^3;  
  
> for j from 1 to 10 do  
> print(j,f(10^(-j)));  
> od;
```

$u := 1.414213562$

$$f := h \rightarrow \frac{1}{2} \frac{(u+h)^4 - (u-h)^4}{h} - 4u^3$$

1, 0.05656855
2, 0.00056571
3, 0.00000551
4, 0.00000151
5, -0.00000849
6, -0.00020849
7, 0.00129151
8, -0.01370849
9, 0.18629151
10, -11.31370849

(1)

```
> Digits:=20;
```

Digits := 20

(2)

```
> u:=evalf(sqrt(2));  
f := h -> ((u+h)^4-(u-h)^4)/(2*h)-4*  
> u^3;  
> for j from 1 to 20 do  
> print(j,f(10^(-j)));  
> od;
```

$u := 1.4142135623730950488$

$$f := h \rightarrow \frac{1}{2} \frac{(u+h)^4 - (u-h)^4}{h} - 4u^3$$

1, 0.056568542494923802
2, 0.000565685424949240
3, 0.000005656854249510
4, 5.6568542610 10⁻⁸
5, 5.65684610 10⁻¹⁰
6, 5.639610 10⁻¹²
7, 2.39610 10⁻¹³
8, 2.39610 10⁻¹³
9, 1.5239610 10⁻¹¹
10, 1.5239610 10⁻¹¹
11, 1.015239610 10⁻⁹
12, 1.015239610 10⁻⁹
13, 1.015239610 10⁻⁹
14, 0.000001501015239610
15, -0.000008498984760390
16, 0.000291501015239610
17, 0.001291501015239610
18, -0.013708498984760390
19, 0.186291501015239610
20, -11.313708498984760390

(3)

```

> restart;
> f:= x->x^6:
> df := (x,h) -> (f(x+h)-f(x-h))/(2*h):
> RE := (x,h)-> (4*df(x,h/2)-df(x,h))/3.0;

```

$$RE := (x, h) \rightarrow \frac{4 df\left(x, \frac{1}{2} h\right) - df(x, h)}{3.0}$$

(4)

```

> u:=sqrt(2.0);

```

u := 1.414213562373095048801688724209698078570

(5)

```

> Digits:=40;
> for j from 1 to 25 do
> print(j,RE(u,10^(-j))-6*u^5,df(u,10^(-j)/2)-6*u^5);
> od;

```

Digits := 40

```

1, -0.00021213203435596425732025330863145471, 0.14147438924589849594449893574812767154
2, -2.121320343559642573202533086311 10-8, 0.00141421886567395394790812173054241389
3, -2.12132034355964257320253304 10-12, 0.00001414213615406103637792753054273029
4, -2.1213203435596425731571 10-16, 1.4142135629034251346915993675429 10-7
5, -2.121320343559645238 10-20, 1.41421356237839834966058781429 10-9
6, -2.12132034321904 10-24, 1.414213562373148081810311429 10-11
7, -2.1212721904 10-28, 1.4142135623730955791611429 10-13
8, -2.055238 10-32, 1.41421356237309504611429 10-15
9, 4.1278096 10-31, 1.414213562373124611429 10-17
10, 5.7944762 10-31, 1.4142135623724611429 10-19
11, 5.7944762 10-31, 1.41421356724611429 10-21
12, -1.9942055238 10-28, 1.414196724611429 10-23
13, -4.36608721904 10-27, 1.3896724611429 10-25
14, 1.896724611429 10-26, 1.896724611429 10-26
15, 7.8563391278096 10-25, 6.1896724611429 10-25
16, 6.1896724611429 10-25, 6.1896724611429 10-25
17, 1.0395230057944762 10-22, 7.061896724611429 10-23
18, -6.9604769942055238 10-22, -5.2938103275388571 10-22
19, -5.2938103275388571 10-22, -5.2938103275388571 10-22
20, 7.613728563391278096 10-20, 5.947061896724611429 10-20
21, -2.4052938103275388571 10-19, -2.4052938103275388571 10-19
22, -1.24052938103275388571 10-18, -1.24052938103275388571 10-18
23, 2.875947061896724611429 10-17, 2.875947061896724611429 10-17
24, -1.7124052938103275388571 10-16, -1.7124052938103275388571 10-16
25, -1.17124052938103275388571 10-15, -1.17124052938103275388571 10-15

```

(6)