

```

h = Flatten[Table[x^n, {n, 0, 3}]];
M = Flatten[Table[{a}, {a, 0, 1}], 1]; M // MatrixForm

$$\begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

A[i_] := D[#, {x, M[[i]]}] &
Collect[{s1, s2, s3, s4}.P[breite].Co.h /. x → y/breite, {s1, s2, s3, s4}] /. y → x
{s1, s2, s3, s4}.P[breite].Co.{1,  $\frac{x}{\text{breite}}$ ,  $\frac{x^2}{\text{breite}^2}$ ,  $\frac{x^3}{\text{breite}^3}$ }
CForm[%]

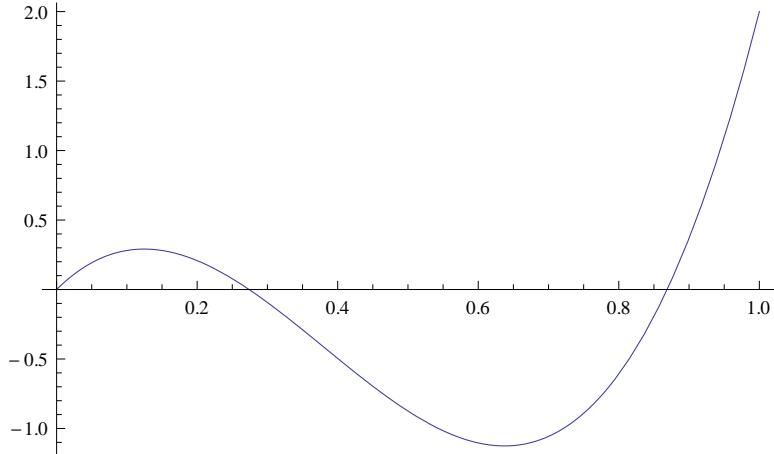
```

```

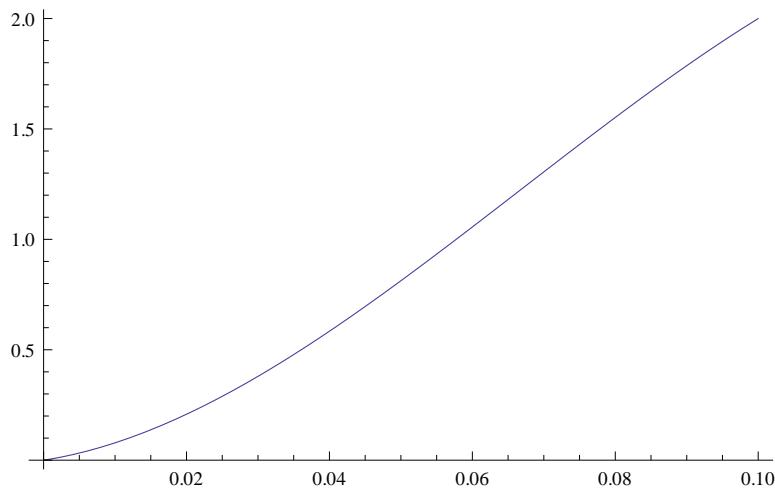
Dot(List(s1, s2, s3, s4), P(breite), Co, List(1, x/breite, Power(x, 2)/Power(breite, 2), Power(x, 3)/P
Co = Inverse[Transpose[Flatten[Table[A[j][h] /. x → M[[i]], {j, 2}, {i, 2}], 1]]]
{{1, 0, -3, 2}, {0, 0, 3, -2}, {0, 1, -2, 1}, {0, 0, -1, 1}}
P[m_] := DiagonalMatrix[{1, 1, m, m}];

```

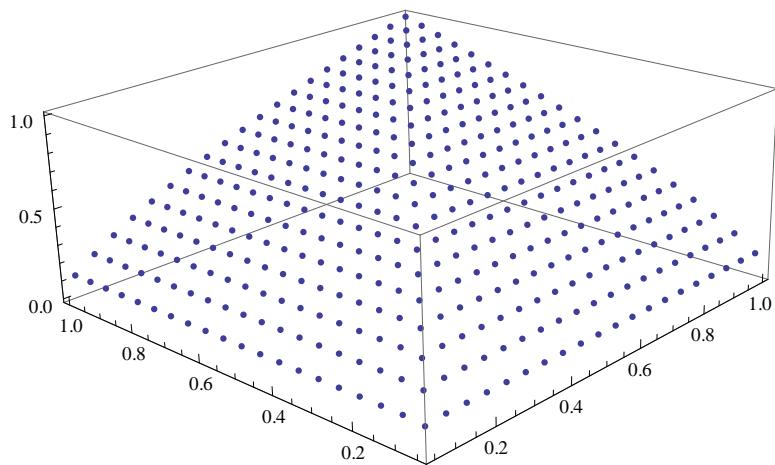
```
s = {0, 2, 5, 20}; Plot[s.Co.h, {x, 0, 1}]
```



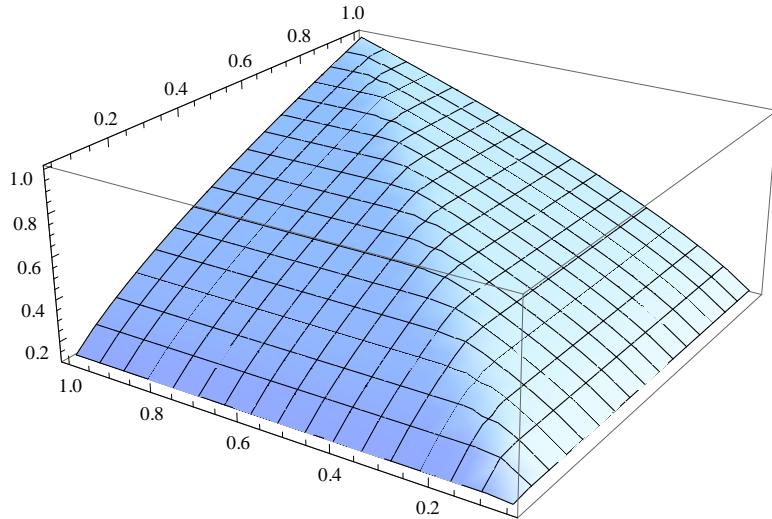
```
s = {0, 2, 5, 20}; b = 0.1;
Plot[{s.P[b].Co.h /. x → y / b}, {y, 0, b}]
```



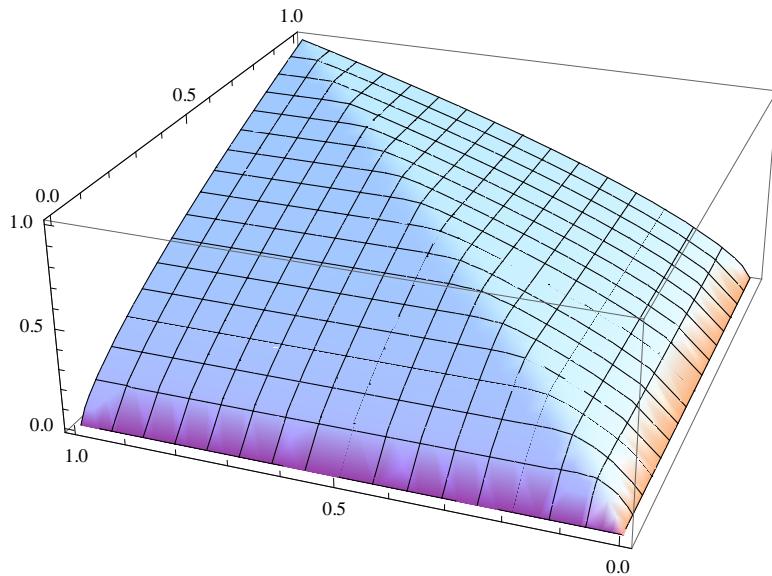
```
A = 20; nx = 20; ny = 20; of = 0.0001;
M2 = Flatten[Table[Join[{x / nx + of, y / ny + of}, Table[ND[f2[#1, #2, 0.999, A] &,
{i, x / nx + of, y / ny + of}, {i, 4}]], {x, nx}, {y, ny}] // N, 1];
ListPointPlot3D[Transpose[Transpose[M2][[1 ;; 3]]]]
```



```
ListPlot3D [Transpose [Transpose [M2 ] [[1 ;; 3]]]]
```



```
Plot3D[f2[x, y, 0.999, A], {x, 0, 1}, {y, 0, 1}]
```



```
nD[f_, x_] := (f[x + dof] - f[x - dof]) / 2 / dof;
dof = 0.000001; ND[f_, i_, x_, y_] :=
Switch[i, 1, f[x, y], 2, nD[f[#, y] &, x], 3, nD[f[x, #] &, y], 4, - $\frac{1}{4 \text{ dof}^2}$ 
(-f[x - dof, y - dof] + f[x - dof, y + dof] + f[x + dof, y - dof] - f[x + dof, y + dof])];
```

**ND**

```
ND[f2[#, .9999, 0.999, A] &, 0.2]
```

$1.13539 \times 10^{-10}$

```
ND[f2[#1, #2, 0.999, A] &, 2, 1, yy]
```

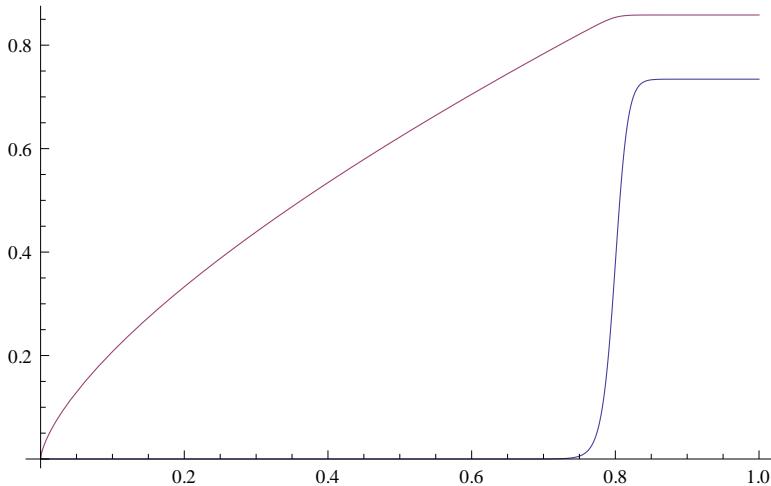
```
nD[(f2[#1, #2, 0.999, A] &) [#1, 0.7] &, 1]
```

```
f2[x_, y_, a_, b_] := Sin[x] Cos[y]
```

```
D[D[f2[x, y, 0.999, A], x], y] /. y -> y /. x -> x
```

```
-Cos[x] Sin[y]
```

```
yy = 0.8; Plot[{ND[f2[#1, #2, 0.999, A] &, 3, x, yy], f2[x, yy, 0.999, A]}, {x, 0, 1}]
```



```
f2[x, yy, 0.99, A], x] /. x -> xx
```

FindRoot::nlnum :

The function value  $\left\{ -0.99 + \left( 2.71828^{(\ll 23\gg + \ll 1\gg)^{1/20}} - 1. \ll 1\gg^{\ll 1\gg} (\ll 1\gg)^{39} \ll 1\gg \ll 2\gg \right) (19. + (\ll 1\gg)^{1/20}) \right\} / \left( 19. + \left( 1.11033 \times 10^{-9} + \ll 1\gg \right)^{1/20} \right)$

is not a list of numbers with dimensions {1} at {z} =  $\{1. \times 10^{-13}\}$ .

```
ND[-0.99, 0.1]
```

```
f2[x, y, z, a]
```

FindRoot::nlnum :

The function value  $\left\{ -1. \times 10^{-13} + \frac{2.71828^{(\ll 1\gg + \ll 1\gg)^{\frac{1}{a}} - 1. \ll 1\gg^{\ll 1\gg} (\ll 1\gg) \left( \frac{\ll 1\gg}{\ll 1\gg} \right)^{2. - \frac{\ll 3\gg}{a}}}}{-1. + a + (\text{Power}[\ll 2\gg] + \text{Power}[\ll 2\gg])^{\frac{1}{a}}} \right\}$

is not a list of numbers with dimensions {1} at {z} =  $\{1. \times 10^{-13}\}$ .

-z