hessian

In[1]:=
```
H = {{x0x0, x0y0, x0z0, x0x1, x0y1, x0z1},
   {y0x0, y0y0, y0z0, y0x1, y0y1, y0z1}, {z0x0, z0y0, z0z0, z0x1, z0y1, z0z1},
   {x1x0, x1y0, x1z0, x1x1, x1y1, x1z1}, {y1x0, y1y0, y1z0, y1x1, y1y1, y1z1},
   {z1x0, z1y0, z1z0, z1x1, z1y1, z1z1}};
MatrixForm[
 H]
```

Out[2]//MatrixForm=

$$\begin{pmatrix} x0x0 & x0y0 & x0z0 & x0x1 & x0y1 & x0z1 \\ y0x0 & y0y0 & y0z0 & y0x1 & y0y1 & y0z1 \\ z0x0 & z0y0 & z0z0 & z0x1 & z0y1 & z0z1 \\ x1x0 & x1y0 & x1z0 & x1x1 & x1y1 & x1z1 \\ y1x0 & y1y0 & y1z0 & y1x1 & y1y1 & y1z1 \\ z1x0 & z1y0 & z1z0 & z1x1 & z1y1 & z1z1 \end{pmatrix}$$

function

In[3]:=
```
V = (1 / 2 * k * (Sqrt[{Subscript[x, 1] - Subscript[x, 0], Subscript[y, 1] - Subscript[y, 0],
          Subscript[z, 1] - Subscript[z, 0]} . {Subscript[x, 1] - Subscript[x, 0],
          Subscript[y, 1] - Subscript[y, 0], Subscript[z, 1] - Subscript[z, 0]}] - l)^2)
```

Out[3]=

$$\frac{1}{2} k \left(-l + \sqrt{(-x_0 + x_1)^2 + (-y_0 + y_1)^2 + (-z_0 + z_1)^2}\right)^2$$

derivatives

In[4]:=
```
x0x0 = D[V, Subscript[x, 0], Subscript[x, 0]]
x0x0 = x0x0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x0x0 = x0x0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x0x0 = x0x0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x0x0 = x0x0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[4]=
$$\frac{k\,(-x_0+x_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}+\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[8]=
$$\frac{k\,(-l+n)}{n}+\frac{k\,(-x_0+x_1)^2}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)^2}{n^3}$$

In[9]:=
```
x0y0 = D[V, Subscript[x, 0], Subscript[y, 0]]
x0y0 = x0y0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x0y0 = x0y0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x0y0 = x0y0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x0y0 = x0y0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[9]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[13]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[14]:=
```
x0z0 = D[V, Subscript[x, 0], Subscript[z, 0]]
x0z0 = x0z0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x0z0 = x0z0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x0z0 = x0z0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x0z0 = x0z0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[14]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[18]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[19]:=
```
x0x1 = D[V, Subscript[x, 0], Subscript[x, 1]]
x0x1 = x0x1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x0x1 = x0x1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x0x1 = x0x1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x0x1 = x0x1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[19]=
$$-\frac{k\,(-x_0+x_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}-\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[23]=
$$-\frac{k\,(-l+n)}{n}-\frac{k\,(-x_0+x_1)^2}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)^2}{n^3}$$

In[24]:=
```
x0y1 = D[V, Subscript[x, 0], Subscript[y, 1]]
x0y1 = x0y1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x0y1 = x0y1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x0y1 = x0y1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x0y1 = x0y1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[24]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[28]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[29]:=
```
x0z1 = D[V, Subscript[x, 0], Subscript[z, 1]]
x0z1 = x0z1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x0z1 = x0z1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x0z1 = x0z1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x0z1 = x0z1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[29]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[33]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[34]:=
```
y0x0 = D[V, Subscript[y, 0], Subscript[x, 0]]
y0x0 = y0x0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y0x0 = y0x0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y0x0 = y0x0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y0x0 = y0x0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[34]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[38]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[39]:=
```
y0y0 = D[V, Subscript[y, 0], Subscript[y, 0]]
y0y0 = y0y0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y0y0 = y0y0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y0y0 = y0y0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y0y0 = y0y0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[39]=
$$\frac{k\,(-y_0+y_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-y_0+y_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}+\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[43]=
$$\frac{k\,(-l+n)}{n}+\frac{k\,(-y_0+y_1)^2}{n^2}-\frac{k\,(-l+n)\,(-y_0+y_1)^2}{n^3}$$

In[44]:=
```
y0z0 = D[V, Subscript[y, 0], Subscript[z, 0]]
y0z0 = y0z0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y0z0 = y0z0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y0z0 = y0z0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y0z0 = y0z0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[44]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[48]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[49]:=
```
y0x1 = D[V, Subscript[y, 0], Subscript[x, 1]]
y0x1 = y0x1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y0x1 = y0x1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y0x1 = y0x1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y0x1 = y0x1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[49]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[53]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[54]:=
```
y0y1 = D[V, Subscript[y, 0], Subscript[y, 1]]
y0y1 = y0y1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y0y1 = y0y1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y0y1 = y0y1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y0y1 = y0y1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[54]=
$$-\frac{k\,(-y_0+y_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-y_0+y_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}-\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[58]=
$$-\frac{k\,(-l+n)}{n}-\frac{k\,(-y_0+y_1)^2}{n^2}+\frac{k\,(-l+n)\,(-y_0+y_1)^2}{n^3}$$

In[59]:=
```
y0z1 = D[V, Subscript[y, 0], Subscript[z, 1]]
y0z1 = y0z1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y0z1 = y0z1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y0z1 = y0z1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y0z1 = y0z1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[59]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[63]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[64]:=
```
z0x0 = D[V, Subscript[z, 0], Subscript[x, 0]]
z0x0 = z0x0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z0x0 = z0x0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z0x0 = z0x0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z0x0 = z0x0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[64]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[68]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[69]:=
```
z0y0 = D[V, Subscript[z, 0], Subscript[y, 0]]
z0y0 = z0y0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z0y0 = z0y0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z0y0 = z0y0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z0y0 = z0y0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[69]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[73]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[74]:=
```
z0z0 = D[V, Subscript[z, 0], Subscript[z, 0]]
z0z0 = z0z0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z0z0 = z0z0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z0z0 = z0z0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z0z0 = z0z0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[74]=
$$\frac{k\,(-z_0+z_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-z_0+z_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}+\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[78]=
$$\frac{k\,(-l+n)}{n}+\frac{k\,(-z_0+z_1)^2}{n^2}-\frac{k\,(-l+n)\,(-z_0+z_1)^2}{n^3}$$

In[79]:=
```
z0x1 = D[V, Subscript[z, 0], Subscript[x, 1]]
z0x1 = z0x1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z0x1 = z0x1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z0x1 = z0x1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z0x1 = z0x1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[79]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[83]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[84]:=
```
z0y1 = D[V, Subscript[z, 0], Subscript[y, 1]]
z0y1 = z0y1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z0y1 = z0y1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z0y1 = z0y1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z0y1 = z0y1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[84]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[88]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[89]:=
```
z0z1 = D[V, Subscript[z, 0], Subscript[z, 1]]
z0z1 = z0z1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z0z1 = z0z1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z0z1 = z0z1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z0z1 = z0z1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[89]=
$$-\frac{k\,(-z_0+z_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-z_0+z_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}-\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[93]=
$$-\frac{k\,(-l+n)}{n}-\frac{k\,(-z_0+z_1)^2}{n^2}+\frac{k\,(-l+n)\,(-z_0+z_1)^2}{n^3}$$

In[94]:=
```
x1x0 = D[V, Subscript[x, 1], Subscript[x, 0]]
x1x0 = x1x0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x1x0 = x1x0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x1x0 = x1x0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x1x0 = x1x0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[94]=
$$-\frac{k\,(-x_0+x_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}-\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[98]=
$$-\frac{k\,(-l+n)}{n}-\frac{k\,(-x_0+x_1)^2}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)^2}{n^3}$$

In[99]:=
```
x1y0 = D[V, Subscript[x, 1], Subscript[y, 0]]
x1y0 = x1y0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x1y0 = x1y0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x1y0 = x1y0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x1y0 = x1y0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[99]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[103]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[104]:=
```
x1z0 = D[V, Subscript[x, 1], Subscript[z, 0]]
x1z0 = x1z0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x1z0 = x1z0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x1z0 = x1z0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x1z0 = x1z0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[104]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[108]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[109]:=
```
x1x1 = D[V, Subscript[x, 1], Subscript[x, 1]]
x1x1 = x1x1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x1x1 = x1x1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x1x1 = x1x1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x1x1 = x1x1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[109]=
$$\frac{k\,(-x_0+x_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}+\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[113]=
$$\frac{k\,(-l+n)}{n}+\frac{k\,(-x_0+x_1)^2}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)^2}{n^3}$$

In[114]:=
```
x1y1 = D[V, Subscript[x, 1], Subscript[y, 1]]
x1y1 = x1y1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x1y1 = x1y1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x1y1 = x1y1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x1y1 = x1y1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[114]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[118]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[119]:=
```
x1z1 = D[V, Subscript[x, 1], Subscript[z, 1]]
x1z1 = x1z1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
x1z1 = x1z1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
x1z1 = x1z1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
x1z1 = x1z1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[119]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[123]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[124]:=
```
y1x0 = D[V, Subscript[y, 1], Subscript[x, 0]]
y1x0 = y1x0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y1x0 = y1x0 /. 1 / Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1 / n;
y1x0 = y1x0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y1x0 = y1x0 /. ((n^2)^(Rational[-3, 2])) → 1 / n^3
```

Out[124]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[128]=
$$-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[129]:=
```
y1y0 = D[V, Subscript[y, 1], Subscript[y, 0]]
y1y0 = y1y0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y1y0 = y1y0 /. 1 / Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1 / n;
y1y0 = y1y0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y1y0 = y1y0 /. ((n^2)^(Rational[-3, 2])) → 1 / n^3
```

Out[129]=
$$-\frac{k\,(-y_0+y_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-y_0+y_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}-\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[133]=
$$-\frac{k\,(-l+n)}{n}-\frac{k\,(-y_0+y_1)^2}{n^2}+\frac{k\,(-l+n)\,(-y_0+y_1)^2}{n^3}$$

In[134]:=
```
y1z0 = D[V, Subscript[y, 1], Subscript[z, 0]]
y1z0 = y1z0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y1z0 = y1z0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y1z0 = y1z0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y1z0 = y1z0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[134]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[138]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[139]:=
```
y1x1 = D[V, Subscript[y, 1], Subscript[x, 1]]
y1x1 = y1x1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y1x1 = y1x1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y1x1 = y1x1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y1x1 = y1x1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[139]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-y_0+y_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[143]=
$$\frac{k\,(-x_0+x_1)\,(-y_0+y_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-y_0+y_1)}{n^3}$$

In[144]:=
```
y1y1 = D[V, Subscript[y, 1], Subscript[y, 1]]
y1y1 = y1y1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y1y1 = y1y1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y1y1 = y1y1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y1y1 = y1y1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[144]=
$$\frac{k\,(-y_0+y_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-y_0+y_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}+\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[148]=
$$\frac{k\,(-l+n)}{n}+\frac{k\,(-y_0+y_1)^2}{n^2}-\frac{k\,(-l+n)\,(-y_0+y_1)^2}{n^3}$$

In[149]:=
```
y1z1 = D[V, Subscript[y, 1], Subscript[z, 1]]
y1z1 = y1z1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
y1z1 = y1z1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
y1z1 = y1z1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
y1z1 = y1z1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[149]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[153]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[154]:=
```
z1x0 = D[V, Subscript[z, 1], Subscript[x, 0]]
z1x0 = z1x0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z1x0 = z1x0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z1x0 = z1x0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z1x0 = z1x0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[154]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[158]=
$$-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[159]:=
```
z1y0 = D[V, Subscript[z, 1], Subscript[y, 0]]
z1y0 = z1y0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z1y0 = z1y0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z1y0 = z1y0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z1y0 = z1y0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[159]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[163]=
$$-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}+\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[164]:=
```
z1z0 = D[V, Subscript[z, 1], Subscript[z, 0]]
z1z0 = z1z0 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z1z0 = z1z0 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z1z0 = z1z0 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z1z0 = z1z0 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[164]=
$$-\frac{k\,(-z_0+z_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}+\frac{k\,(-z_0+z_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}-\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[168]=
$$-\frac{k\,(-l+n)}{n}-\frac{k\,(-z_0+z_1)^2}{n^2}+\frac{k\,(-l+n)\,(-z_0+z_1)^2}{n^3}$$

In[169]:=
```
z1x1 = D[V, Subscript[z, 1], Subscript[x, 1]]
z1x1 = z1x1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z1x1 = z1x1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z1x1 = z1x1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z1x1 = z1x1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[169]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-x_0+x_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[173]=
$$\frac{k\,(-x_0+x_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-x_0+x_1)\,(-z_0+z_1)}{n^3}$$

In[174]:=
```
z1y1 = D[V, Subscript[z, 1], Subscript[y, 1]]
z1y1 = z1y1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z1y1 = z1y1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z1y1 = z1y1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z1y1 = z1y1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[174]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-y_0+y_1)\,(-z_0+z_1)\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}$$

Out[178]=
$$\frac{k\,(-y_0+y_1)\,(-z_0+z_1)}{n^2}-\frac{k\,(-l+n)\,(-y_0+y_1)\,(-z_0+z_1)}{n^3}$$

In[179]:=
```
z1z1 = D[V, Subscript[z, 1], Subscript[z, 1]]
z1z1 = z1z1 /.
   Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 + (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2] → n;
z1z1 = z1z1 /. 1/Sqrt[(-Subscript[x, 0] + Subscript[x, 1])^2 +
       (-Subscript[y, 0] + Subscript[y, 1])^2 +
       (-Subscript[z, 0] + Subscript[z, 1])^2] → 1/n;
z1z1 = z1z1 /. ((-Subscript[x, 0] + Subscript[x, 1])^2 +
      (-Subscript[y, 0] + Subscript[y, 1])^2 +
      (-Subscript[z, 0] + Subscript[z, 1])^2) → n^2;
z1z1 = z1z1 /. ((n^2)^(Rational[-3, 2])) → 1/n^3
```

Out[179]=
$$\frac{k\,(-z_0+z_1)^2}{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}-\frac{k\,(-z_0+z_1)^2\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\left((-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2\right)^{3/2}}+\frac{k\left(-l+\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}\right)}{\sqrt{(-x_0+x_1)^2+(-y_0+y_1)^2+(-z_0+z_1)^2}}$$

Out[183]=
$$\frac{k\,(-l+n)}{n}+\frac{k\,(-z_0+z_1)^2}{n^2}-\frac{k\,(-l+n)\,(-z_0+z_1)^2}{n^3}$$

final

In[184]:=
```
Insert[Grid[H], {Dividers → All, Spacings → 1.5 {1, 1}}, 2]
```

Out[184]=

$\frac{k(-l+n)}{n} + \frac{k(-x_0+x_1)^2}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)^2$	$\frac{k(-x_0+x_1)(-y_0+y_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$\frac{k(-x_0+x_1)(-z_0+z_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-z_0+z_1)$	$-\frac{k(-l+n)}{n} - \frac{k(-x_0+x_1)^2}{n^2} + \frac{1}{n^3} k(-l+n)(-x_0+x_1)^2$	$-\frac{1}{n^2} k(-x_0+x_1)(-y_0+y_1) + \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$-\frac{1}{n^2} k(-x_0+x_1)(-z_0+z_1) + \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-z_0+z_1)$
$\frac{k(-x_0+x_1)(-y_0+y_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$\frac{k(-l+n)}{n} + \frac{k(-y_0+y_1)^2}{n^2} - \frac{1}{n^3} k(-l+n)(-y_0+y_1)^2$	$\frac{k(-y_0+y_1)(-z_0+z_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-y_0+y_1)(-z_0+z_1)$	$-\frac{1}{n^2} k(-x_0+x_1)(-y_0+y_1) + \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$-\frac{k(-l+n)}{n} - \frac{k(-y_0+y_1)^2}{n^2} + \frac{1}{n^3} k(-l+n)(-y_0+y_1)^2$	$-\frac{1}{n^2} k(-y_0+y_1)(-z_0+z_1) + \frac{1}{n^3} k(-l+n)(-y_0+y_1)(-z_0+z_1)$
$\frac{k(-x_0+x_1)(-z_0+z_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-z_0+z_1)$	$\frac{k(-y_0+y_1)(-z_0+z_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-y_0+y_1)(-z_0+z_1)$	$\frac{k(-l+n)}{n} + \frac{k(-z_0+z_1)^2}{n^2} - \frac{1}{n^3} k(-l+n)(-z_0+z_1)^2$	$-\frac{1}{n^2} k(-x_0+x_1)(-z_0+z_1) + \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-z_0+z_1)$	$-\frac{1}{n^2} k(-y_0+y_1)(-z_0+z_1) + \frac{1}{n^3} k(-l+n)(-y_0+y_1)(-z_0+z_1)$	$-\frac{k(-l+n)}{n} - \frac{k(-z_0+z_1)^2}{n^2} + \frac{1}{n^3} k(-l+n)(-z_0+z_1)^2$
$-\frac{k(-l+n)}{n} - \frac{k(-x_0+x_1)^2}{n^2} + \frac{1}{n^3} k(-l+n)(-x_0+x_1)^2$	$-\frac{1}{n^2} k(-x_0+x_1)(-y_0+y_1) + \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$-\frac{1}{n^2} k(-x_0+x_1)(-z_0+z_1) + \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-z_0+z_1)$	$\frac{k(-l+n)}{n} + \frac{k(-x_0+x_1)^2}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)^2$	$\frac{k(-x_0+x_1)(-y_0+y_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$\frac{k(-x_0+x_1)(-z_0+z_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-z_0+z_1)$
$-\frac{1}{n^2} k(-x_0+x_1)(-y_0+y_1) + \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$-\frac{k(-l+n)}{n} - \frac{k(-y_0+y_1)^2}{n^2} + \frac{1}{n^3} k(-l+n)(-y_0+y_1)^2$	$-\frac{1}{n^2} k(-y_0+y_1)(-z_0+z_1) + \frac{1}{n^3} k(-l+n)(-y_0+y_1)(-z_0+z_1)$	$\frac{k(-x_0+x_1)(-y_0+y_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-x_0+x_1)(-y_0+y_1)$	$\frac{k(-l+n)}{n} + \frac{k(-y_0+y_1)^2}{n^2} - \frac{1}{n^3} k(-l+n)(-y_0+y_1)^2$	$\frac{k(-y_0+y_1)(-z_0+z_1)}{n^2} - \frac{1}{n^3} k(-l+n)(-y_0+y_1)(-z_0+z_1)$

$-\frac{1}{n^2}k(-x_0+x_1)(-z_0+z_1)+\frac{1}{n^3}k(-l+n)(-x_0+x_1)(-z_0+z_1)$	$-\frac{1}{n^2}k(-y_0+y_1)(-z_0+z_1)+\frac{1}{n^3}k(-l+n)(-y_0+y_1)(-z_0+z_1)$	$-\frac{k(-l+n)}{n}-\frac{k(-z_0+z_1)^2}{n^2}+\frac{1}{n^3}k(-l+n)(-z_0+z_1)^2$	$\frac{k(-x_0+x_1)(-z_0+z_1)}{n^2}-\frac{1}{n^3}k(-l+n)(-x_0+x_1)(-z_0+z_1)$	$\frac{k(-y_0+y_1)(-z_0+z_1)}{n^2}-\frac{1}{n^3}k(-l+n)(-y_0+y_1)(-z_0+z_1)$	$\frac{k(-l+n)}{n}+\frac{k(-z_0+z_1)^2}{n^2}-\frac{1}{n^3}k(-l+n)(-z_0+z_1)^2$