In[2]:= `? BesselJ`

Out[2]=

Symbol

BesselJ $[n, z]$ gives the Bessel function of the first kind $J_n(z)$.

In[10]:=
```
Limit[D[D[BesselJ[0, k Sqrt[(x1 - x2)^2 + (y1 - y2)^2 + (z1 - z2)^2]], x1], x2],
 {x1 → 0, x2 → 0, y1 → 0, y2 → 0, z1 → d, z2 → d}]
```

Out[10]= $\frac{k^2}{2}$

In[11]:=
```
D[D[BesselJ[0, k Sqrt[(x1 - x2)^2 + (y1 - y2)^2 + (z1 - z2)^2]], x1], x2]
```

Out[11]=
$$-\frac{k\,(x1-x2)^2\,\mathrm{BesselJ}\left[1,k\sqrt{(x1-x2)^2+(y1-y2)^2+(z1-z2)^2}\right]}{\left((x1-x2)^2+(y1-y2)^2+(z1-z2)^2\right)^{3/2}}+\frac{k\,\mathrm{BesselJ}\left[1,k\sqrt{(x1-x2)^2+(y1-y2)^2+(z1-z2)^2}\right]}{\sqrt{(x1-x2)^2+(y1-y2)^2+(z1-z2)^2}}+\left(k^2\,(x1-x2)^2\left(\mathrm{BesselJ}\left[0,k\sqrt{(x1-x2)^2+(y1-y2)^2+(z1-z2)^2}\right]-\mathrm{BesselJ}\left[2,k\sqrt{(x1-x2)^2+(y1-y2)^2+(z1-z2)^2}\right]\right)\right)\Big/\left(2\left((x1-x2)^2+(y1-y2)^2+(z1-z2)^2\right)\right)$$

In[12]:=
```
Limit[BesselJ[0, k Sqrt[(x1 - x2)^2 + (y1 - y2)^2 + (z1 - z2)^2]],
 {x1 → 0, x2 → 0, y1 → 0, y2 → 0, z1 → d, z2 → d}]
```

Out[12]= 1