In[1]:=
```
rp = {0, 0, d / 2}
rm = {0, 0, -d / 2}
V[r_] := q / Sqrt[(r - rp).(r - rp)] - q / Sqrt[(r - rm).(r - rm)]
```

Out[1]= $\left\{0, 0, \frac{d}{2}\right\}$

Out[2]= $\left\{0, 0, -\frac{d}{2}\right\}$

In[11]:=
```
-∇{x,y,z} V[{x, y, z}]
```

Out[11]=

$$\left\{\frac{q\,x}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,x}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}},\right.$$

$$\left.\frac{q\,y}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,y}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}},\frac{q\left(-\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\left(\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right\}$$

In[13]:=
```
EfieldCartesian[r_] = {q x / (x^2 + y^2 + (-d/2 + z)^2)^(3/2) - q x / (x^2 + y^2 + (d/2 + z)^2)^(3/2),
  q y / (x^2 + y^2 + (-d/2 + z)^2)^(3/2) - q y / (x^2 + y^2 + (d/2 + z)^2)^(3/2),
  q (-d/2 + z) / (x^2 + y^2 + (-d/2 + z)^2)^(3/2) - q (d/2 + z) / (x^2 + y^2 + (d/2 + z)^2)^(3/2)}
```

Out[13]=

$$\left\{\frac{q\,x}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,x}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}},\right.$$

$$\left.\frac{q\,y}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,y}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}},\frac{q\left(-\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\left(\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right\}$$

In[14]:=
```
EfieldSpherical =
 CoordinateTransform["Cartesian" → "Spherical", EfieldCartesian[{x, y, z}]]
```

Out[14]=

$$\left\{\sqrt{\left(\frac{q\,x}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,x}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right)^2+\left(\frac{q\,y}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,y}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right)^2+\left(\frac{q\left(-\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\left(\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right)^2},\right.$$

$$\text{ArcTan}\left[\frac{q\left(-\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\left(\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}},\right.$$

$$\left.\sqrt{\left(\frac{q\,x}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,x}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right)^2+\left(\frac{q\,y}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,y}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right)^2}\right],$$

$$\left.\text{ArcTan}\left[\frac{q\,x}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,x}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}},\frac{q\,y}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,y}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right]\right\}$$

In[15]:=
```
EfieldCylindrical =
 CoordinateTransform["Cartesian" → "Cylindrical", EfieldCartesian[{x, y, z}]]
```

Out[15]=

$$\left\{\sqrt{\left(\frac{q\,x}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,x}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right)^2+\left(\frac{q\,y}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,y}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right)^2},\right.$$

$$\text{ArcTan}\left[\frac{q\,x}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,x}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}},\frac{q\,y}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\,y}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right],$$

$$\left.\frac{q\left(-\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(-\frac{d}{2}+z\right)^2\right)^{3/2}}-\frac{q\left(\frac{d}{2}+z\right)}{\left(x^2+y^2+\left(\frac{d}{2}+z\right)^2\right)^{3/2}}\right\}$$

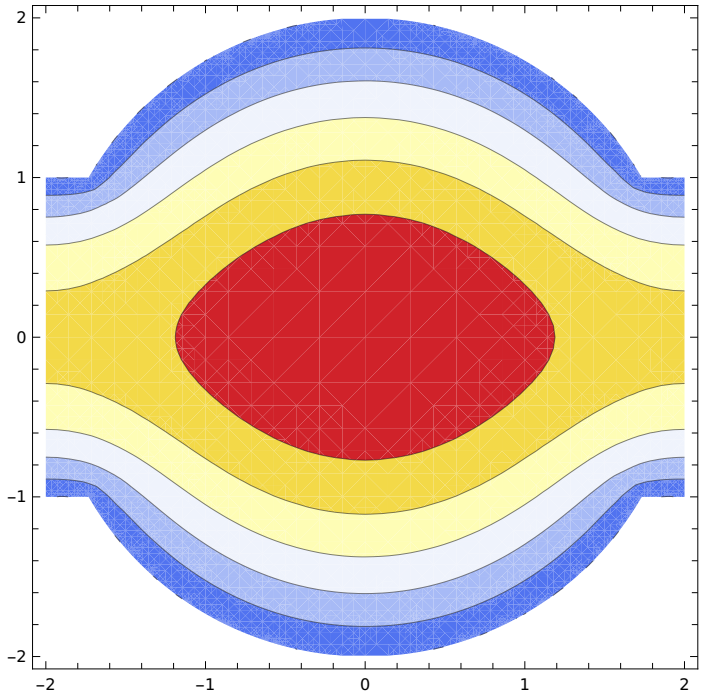
In[216]:=

```
Clear[x]
region = RegionUnion[Disk[{0, 0}, 2], Rectangle[{-2, -1}, {2, 1}]]

ufun = NDSolveValue[{∇²{x,y} u[x, y] == -1,
  PeriodicBoundaryCondition[u[x, y], x == -2,
   Function[x , x + {4, 0}]],
  DirichletCondition[
   u[x, y] == 0, -2 < x < 2]},
 u, {x, y} ∈ region];

graph = ContourPlot[ufun[x, y], {x, y} ∈ region,
   ColorFunction → "TemperatureMap", AspectRatio → Automatic]
```

Out[217]=

```
BooleanRegion[#1 || #2 &, {Disk[{0, 0}, 2], Rectangle[{-2, -1}, {2, 1}]}]
```

Out[219]=




```
Rectangle[{-1, -2}, {1, 2}]
```