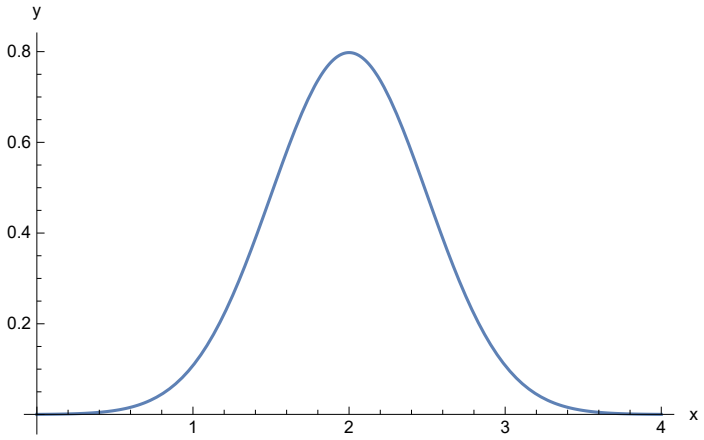
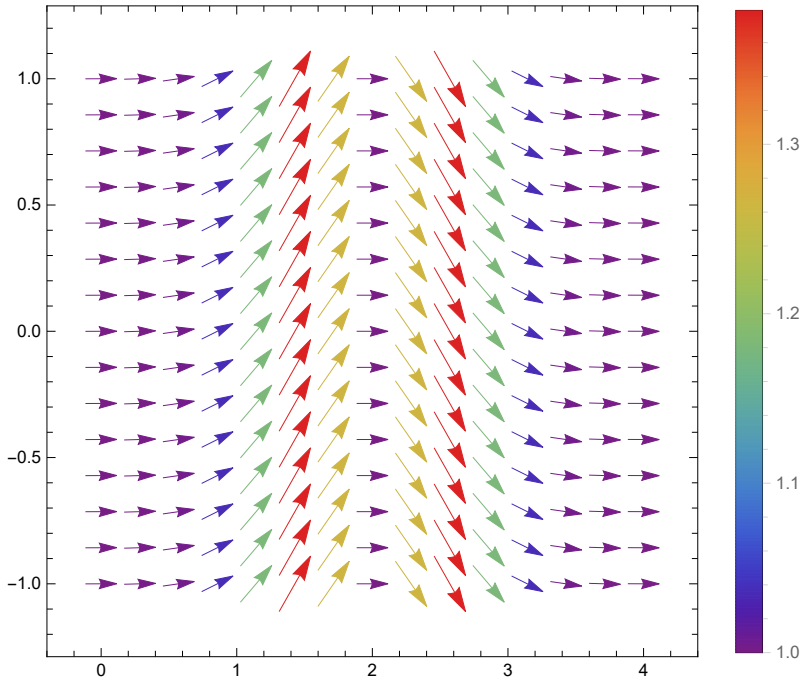
In[ ]:=
```
G1[x_, σ_] := (1 / ((σ) * Sqrt[2 Pi])) Exp[- ((x - a) ^2) / (2 σ^2)];
a = 2;
grad[x_, σ_] = Grad[G1[x, σ], {x}]
Plot[G1[x, σ = 0.5], {x, 0, 4}, PlotPoints → 100, PlotRange → Full, AxesLabel → {"x", "y"}]
VectorPlot[{1, grad[x, σ = 0.5]}, {x, 0, 4}, {y, -1, 1},
 VectorStyle → Black, VectorColorFunction → "Rainbow", PlotLegends → Automatic]
```

Out[ ]=
$$\left\{-\frac{e^{-\frac{(-2+x)^2}{2\sigma^2}}\left(-2+x\right)}{\sqrt{2\pi}\ \sigma^3}\right\}$$

Out[ ]=



Out[ ]=

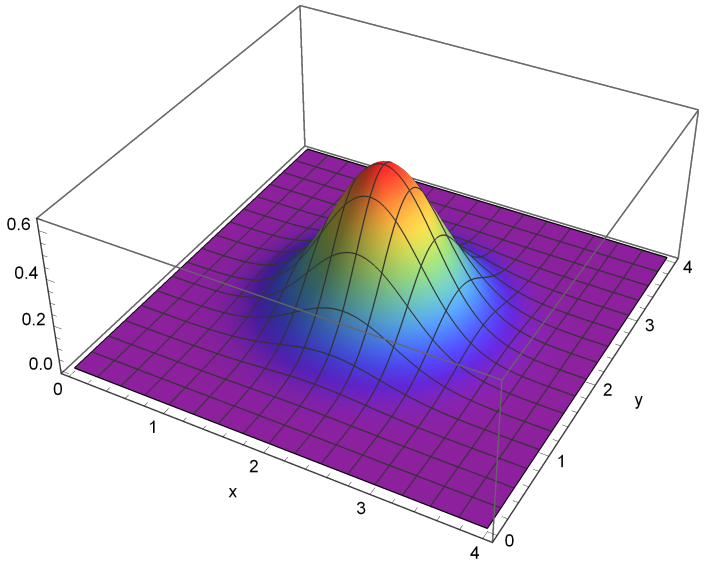


In[ ]:=
```
Exit
```

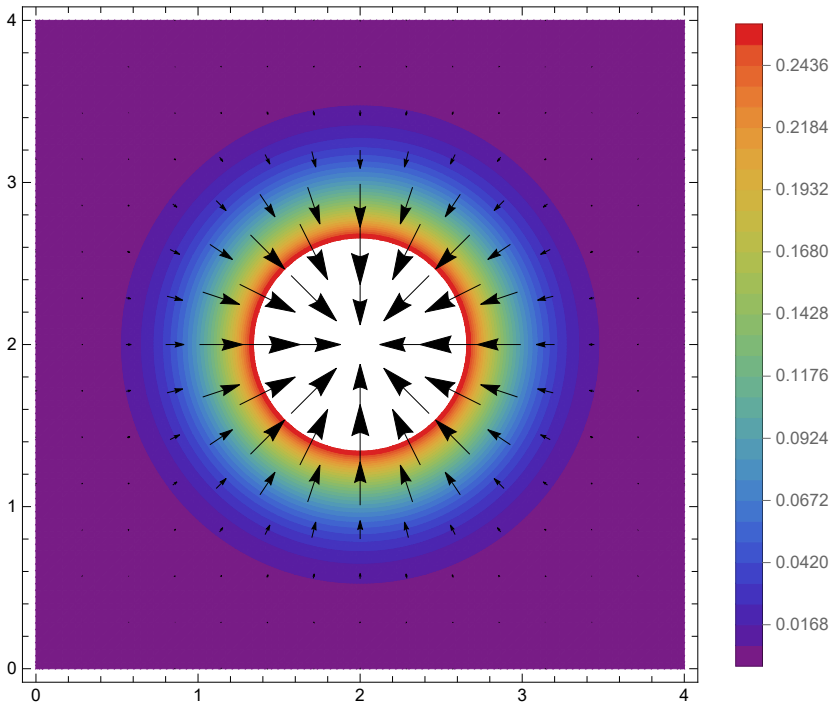
In[•]:=
```
G2[x_, y_, σ_] := (1 / ((σ^2) * 2 Pi)) Exp[-(((x - a) ^2) + ((y - b) ^2)) / (2 σ^2)];
a = 2; b = 2;
grad[x_, y_, σ_] = Grad[G2[x, y, σ], {x, y}]
Plot3D[G2[x, y, σ = 0.5], {x, 0, 4}, {y, 0, 4}, PlotPoints → 100,
 PlotRange → Full, AxesLabel → {"x", "y"}, ColorFunction → "Rainbow"]
plot1 = ContourPlot[G2[x, y, σ = 0.5], {x, 0, 4}, {y, 0, 4}, PlotPoints → 100, Contours → 30,
   ContourStyle → None, PlotLegends → Automatic, ColorFunction → "Rainbow"];
plot2 = VectorPlot[grad[x, y, σ = 0.5], {x, 0, 4}, {y, 0, 4}, VectorStyle → Black];
Show[plot1, plot2]
```

Out[•]=
$$\left\{-2.54648\, e^{2.\left(-(-2+x)^2-(-2+y)^2\right)}\left(-2+x\right),\ -2.54648\, e^{2.\left(-(-2+x)^2-(-2+y)^2\right)}\left(-2+y\right)\right\}$$

Out[•]=



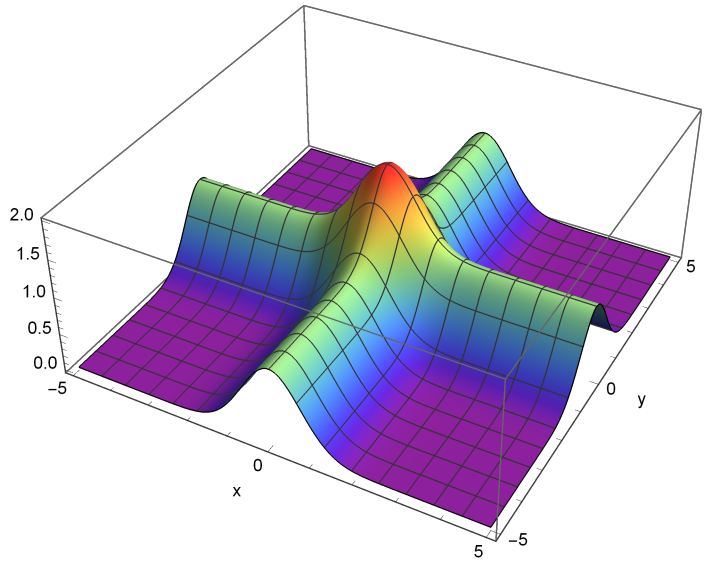
Out[•]=



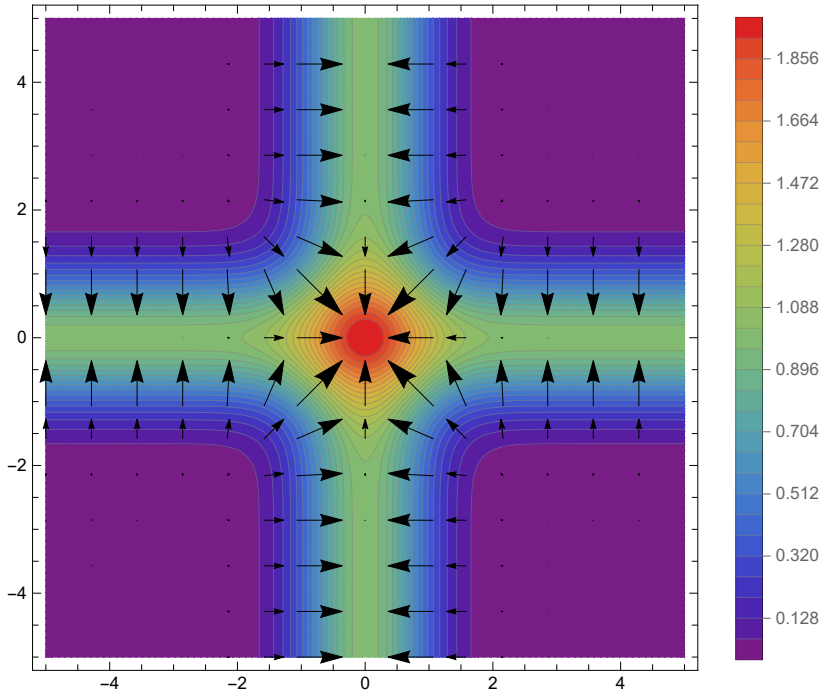
In[•]:=
```
g2[x_, y_] := Exp[-x^2] + Exp[-y^2];
grad[x_, y_] = Grad[g2[x, y], {x, y}]
Plot3D[g2[x, y], {x, -5, 5}, {y, -5, 5}, PlotPoints → 100,
 PlotRange → Full, AxesLabel → {"x", "y"}, ColorFunction → "Rainbow"]
plot1 = ContourPlot[g2[x, y], {x, -5, 5}, {y, -5, 5}, PlotPoints → 100, Contours → 30,
   ContourStyle → Gray, PlotLegends → Automatic, ColorFunction → "Rainbow"];
plot2 = VectorPlot[grad[x, y], {x, -5, 5}, {y, -5, 5}, VectorStyle → Black];
Show[plot1, plot2]
```

Out[•]= $\{-2\, e^{-x^2}\, x,\ -2\, e^{-y^2}\, y\}$

Out[•]=



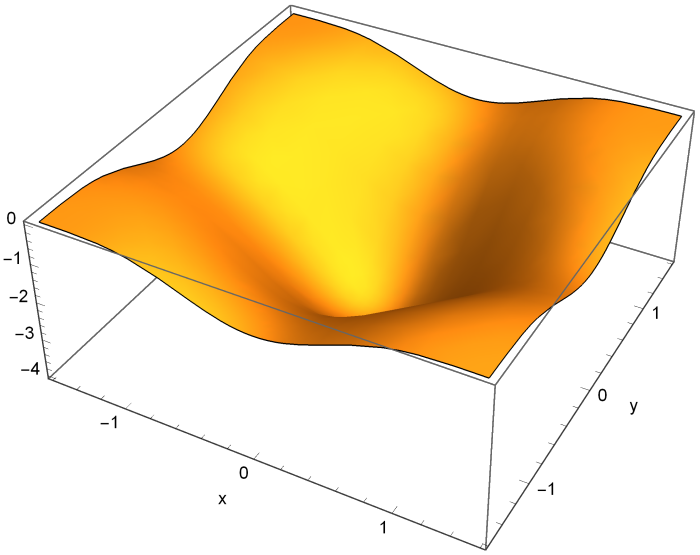
Out[•]=



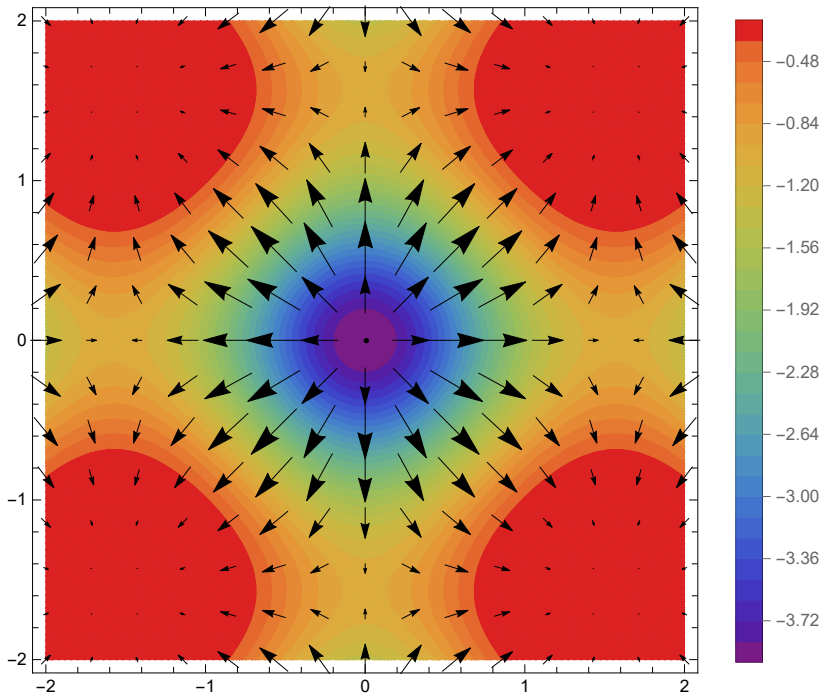
In[ ]:=
```
f[x_, y_] := -((Cos[x])^2 + (Cos[y])^2)^2;
grad[x_, y_] = Grad[f[x, y], {x, y}]
Plot3D[f[x, y], {x, -Pi/2, Pi/2}, {y, -Pi/2, Pi/2}, Mesh → None, AxesLabel → {"x", "y"}]
plot1 = ContourPlot[f[x, y], {x, -2, 2},
   {y, -2, 2}, PlotPoints → 100, Contours → 30, ContourStyle → None,
   PlotLegends → Automatic, ColorFunction → "Rainbow", AxesLabel → {"x", "y"}];
plot2 = VectorPlot[grad[x, y], {x, -2, 2}, {y, -2, 2},
   VectorStyle → Black, FrameLabel → {"x", "y"}];
Show[
 plot1,
 plot2]
```

Out[ ]=
$$\{4\,\mathrm{Cos}[x]\,(\mathrm{Cos}[x]^2+\mathrm{Cos}[y]^2)\,\mathrm{Sin}[x],\ 4\,\mathrm{Cos}[y]\,(\mathrm{Cos}[x]^2+\mathrm{Cos}[y]^2)\,\mathrm{Sin}[y]\}$$

Out[ ]=



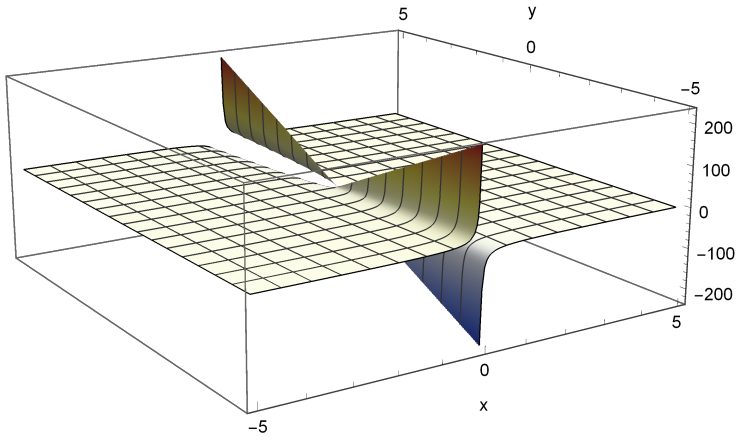
Out[ ]=



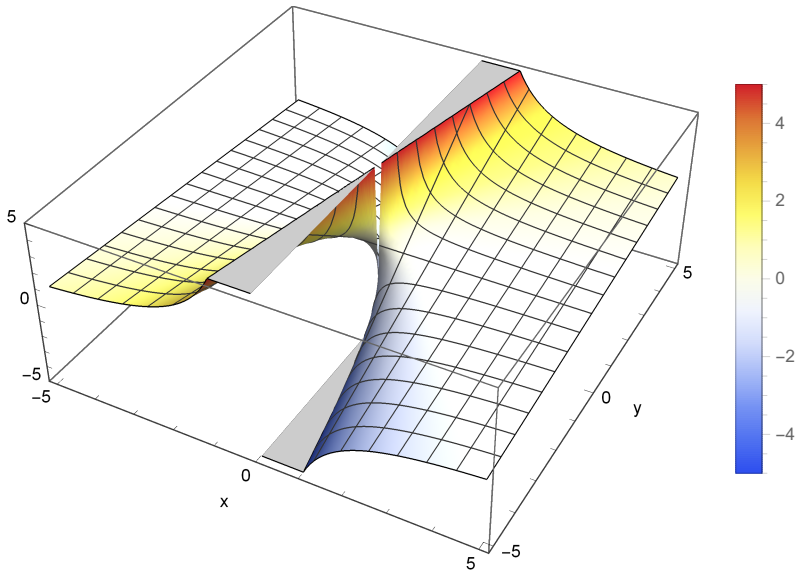
In[153]:=
```
f2[x_, y_] := y / x;
grad[x_, y_] = Grad[f2[x, y], {x, y}]
Plot3D[f2[x, y], {x, -5, 5}, {y, -5, 5}, PlotPoints → 100,
 PlotRange → Full, AxesLabel → {"x", "y"}, ColorFunction → "TemperatureMap"]
Plot3D[f2[x, y], {x, -5, 5}, {y, -5, 5}, PlotPoints → 100, PlotRange → {-5, 5},
 AxesLabel → {"x", "y"}, ColorFunction → "TemperatureMap", PlotLegends → Automatic]
plot1 = ContourPlot[f2[x, y], {x, -5, 5}, {y, -5, 5}, PlotPoints → 100, Contours → 30,
   ContourStyle → Gray, PlotLegends → Automatic, ColorFunction → "TemperatureMap"];
plot2 = VectorPlot[grad[x, y], {x, -5, 5}, {y, -5, 5}, VectorStyle → Black];
Show[plot1, plot2]
VectorPlot[grad[x, y], {x, -1, -0.3}, {y, -1, 1}, VectorStyle → Black]
VectorPlot[grad[x, y], {x, 0.3, 1}, {y, -1, 1}, VectorStyle → Black]
```

Out[154]= $\left\{-\frac{y}{x^2}, \frac{1}{x}\right\}$

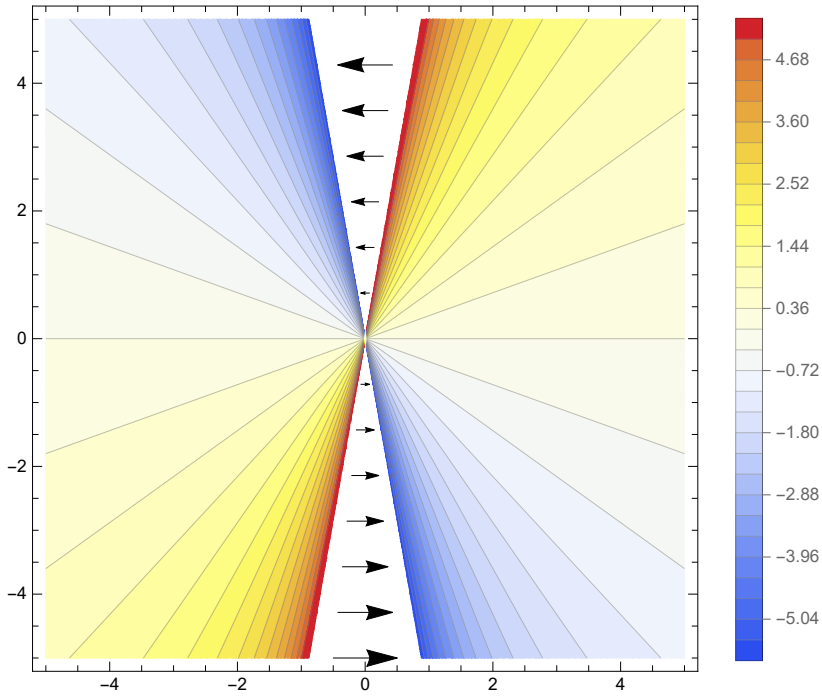
Out[155]=



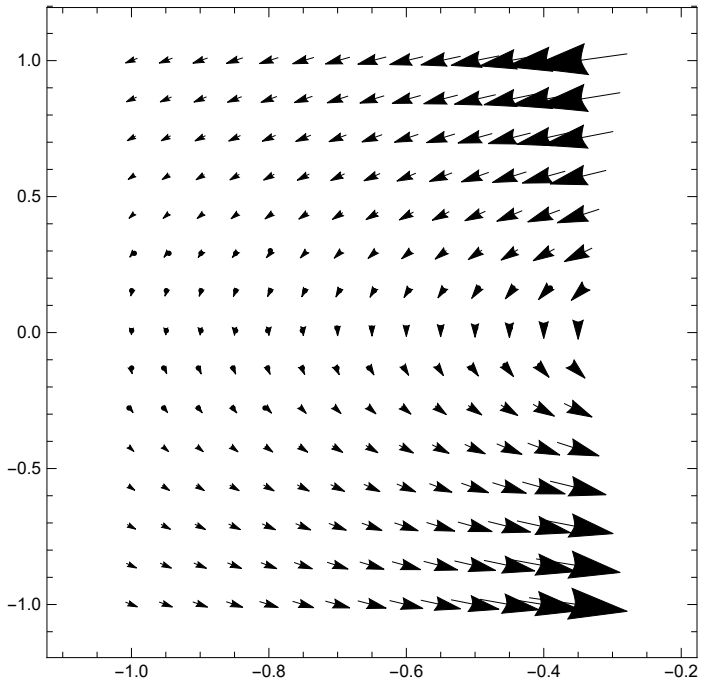
Out[156]=



Out[159]=



Out[160]=



Out[161]=