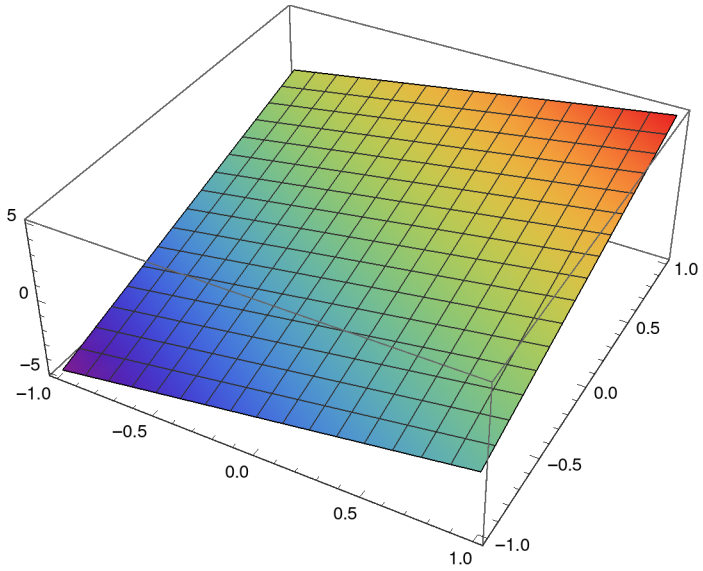
In[ ]:=
```
SetOptions[Plot3D(*Or whichever plot you desire*),
  ColorFunction → "Rainbow"(*One of many options*)];
```

In[ ]:=
```
SetOptions[ParametricPlot(*Or whichever plot you desire*),
  PlotStyle → Orange(*One of many options*)];
SetOptions[ParametricPlot3D(*Or whichever plot you desire*),
  PlotStyle → Red(*One of many op*)];
SetOptions[ContourPlot(*Or whichever plot you desire*),
  ColorFunction → "Rainbow"(*One of many options*)];
```

(*1a*)

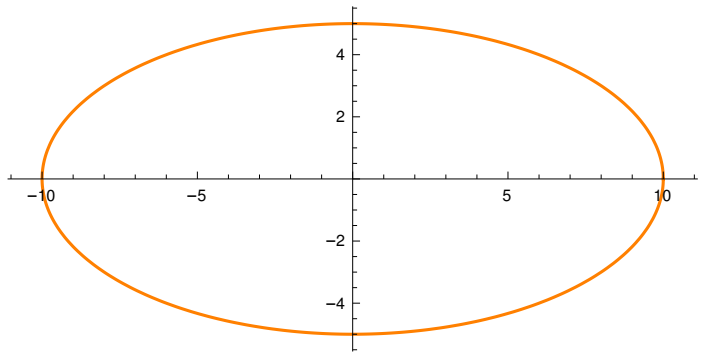
In[ ]:=
```
Plot3D[2 x + 3 y, {x, -1, 1}, {y, -1, 1}]
```

Out[ ]=



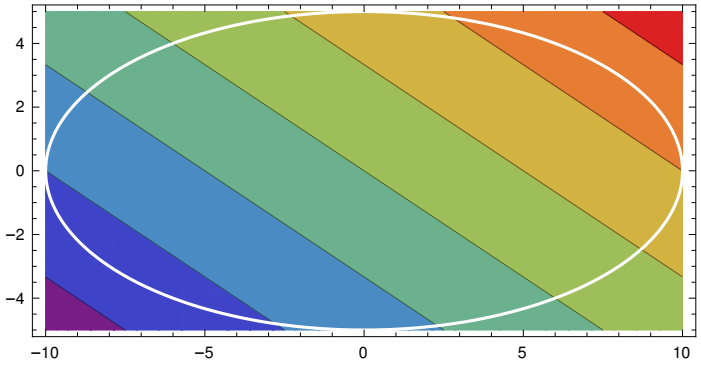
In[ ]:=
```
ParametricPlot[{10 Cos[u], 5 Sin[u]}, {u, 0, 2 Pi}]
```

Out[ ]=



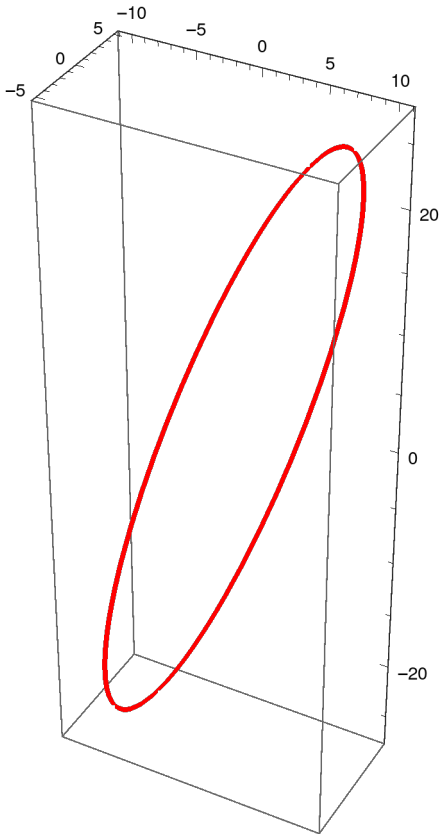
In[ ]:=
```
Show[ContourPlot[2 x + 3 y, {x, -10, 10}, {y, -5, 5}, AspectRatio → Automatic],
 ParametricPlot[{10 Cos[u], 5 Sin[u]}, {u, 0, 2 Pi}, PlotStyle → White]]
```

Out[ ]=



In[ ]:=
```
ParametricPlot3D[{10 Cos[u], 5 Sin[u], 20 Cos[u] + 15 Sin[u]},
 {u, 0, 2 Pi}, BoxRatios → Automatic]
```

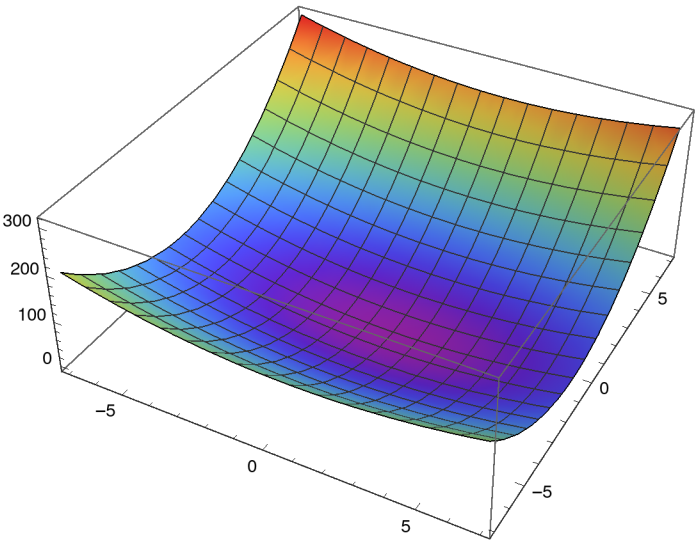
Out[ ]=



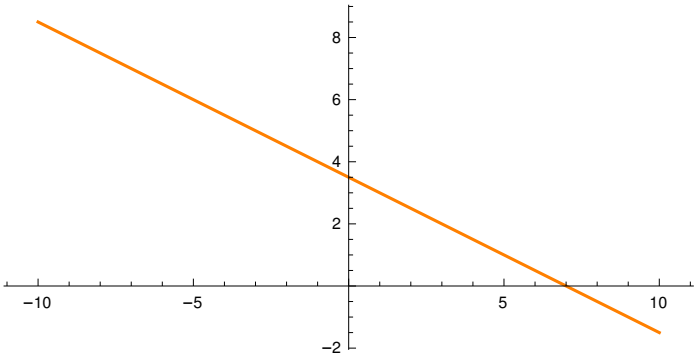
In[ ]:=
```
f = x^2 + 4 y^2 - 2 x + 8 y
Plot3D[f, {x, -7, 7}, {y, -7, 7}]
g = ParametricPlot[{u, (7 - u) / 2}, {u, -10, 10}]
Show[ContourPlot[f, {x, -10, 10}, {y, -10, 10}, AspectRatio → Automatic], g]
ParametricPlot3D[{u, (7 - u) / 2, u^2 + 4 ((7 - u) / 2)^2 - 2 u + 8 (7 - u) / 2},
 {u, -10, 10}, BoxRatios → {1, 1, 1}]
```

Out[ ]= $-2\,x + x^2 + 8\,y + 4\,y^2$

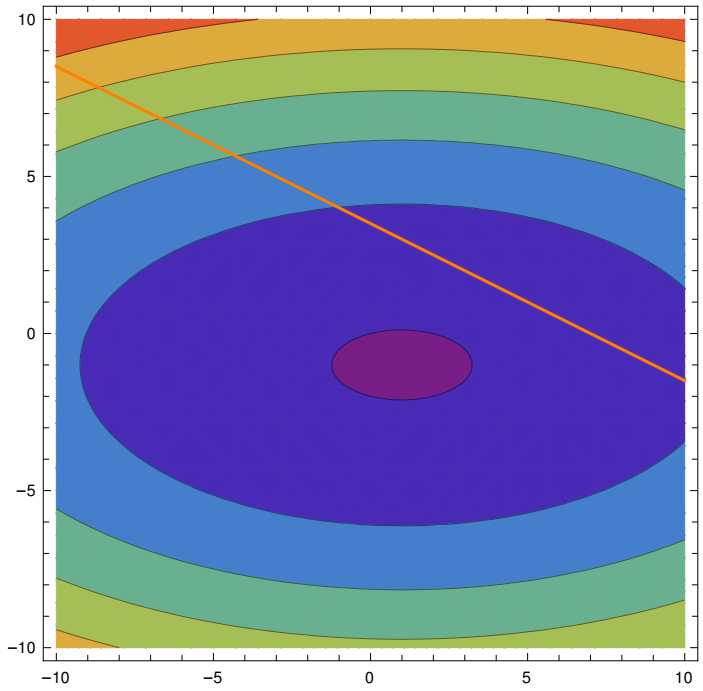
Out[ ]=



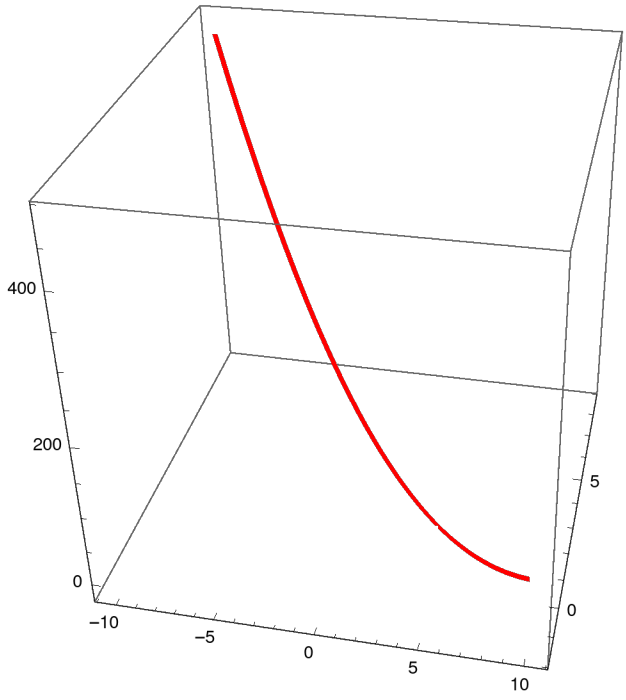
Out[ ]=



Out[ ]=



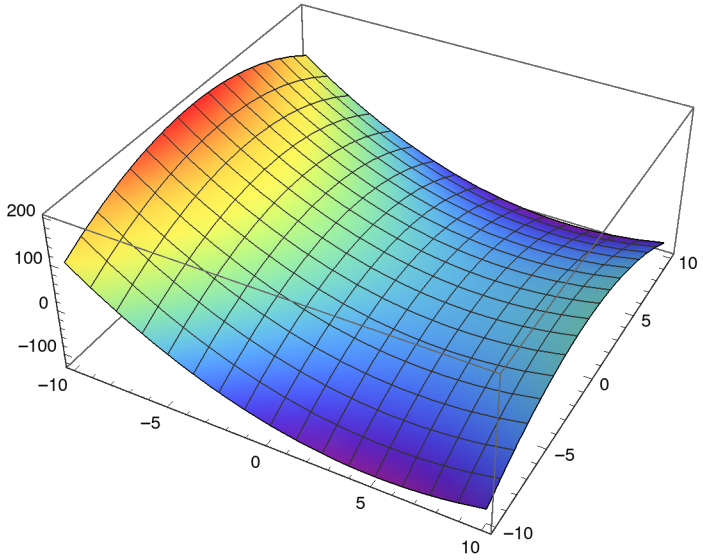
Out[ ]=



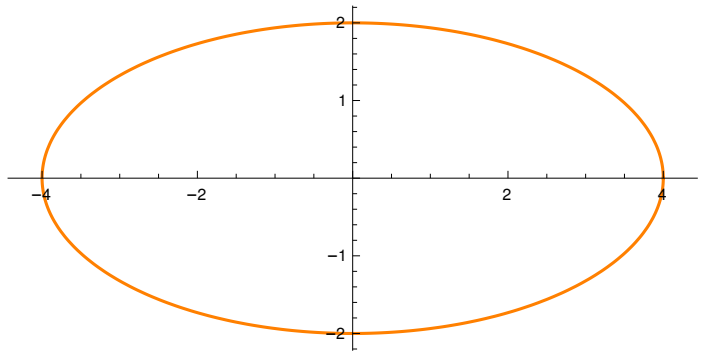
In[ ]:=
```
f = x^2 - 10 x - y^2
Plot3D[f, {x, -10, 10}, {y, -10, 10}]
g = ParametricPlot[{4 Cos[u], 2 Sin[u]}, {u, 0, 2 Pi}]
Show[ContourPlot[f, {x, -10, 10}, {y, -10, 10}, AspectRatio → Automatic],
 ParametricPlot[{4 Cos[u], 2 Sin[u]}, {u, 0, 2 Pi}, PlotStyle → White]]
ParametricPlot3D[{4 Cos[u], 2 Sin[u], (4 Cos[u])^2 - (2 Sin[u])^2 - 10 Cos[u]},
 {u, 0, 2 Pi}, BoxRatios → {1, 1, 1}]
```

Out[ ]= $-10\,x + x^2 - y^2$

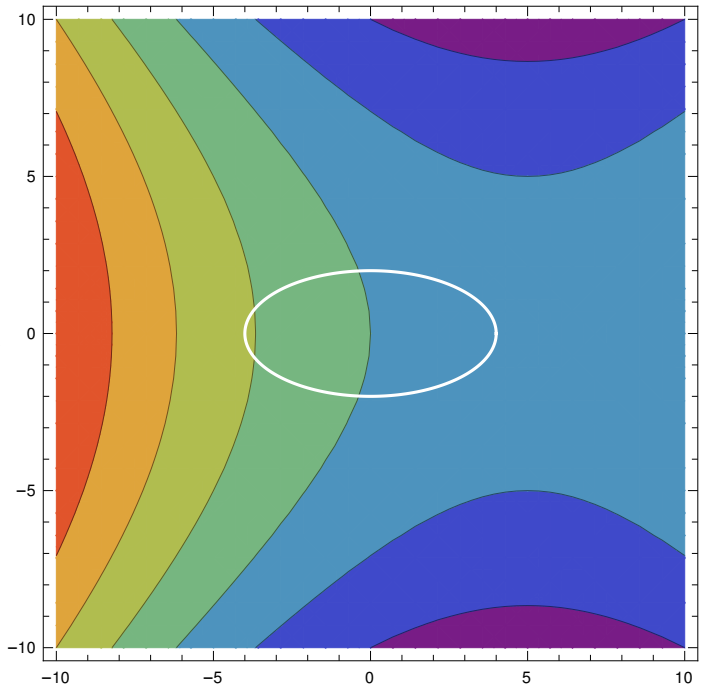
Out[ ]=



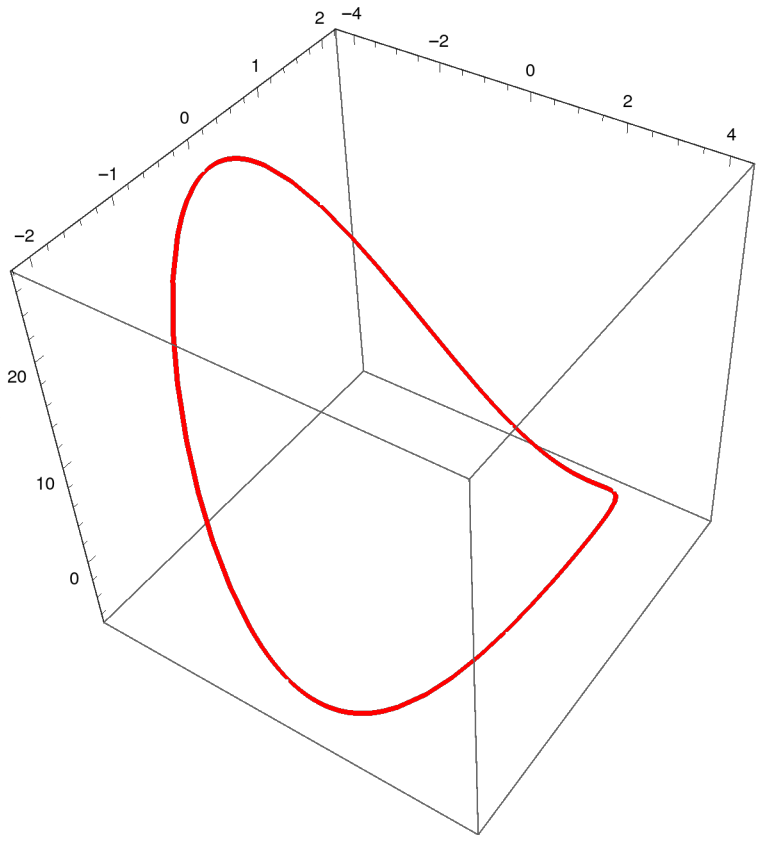
Out[ ]=



Out[ ]=



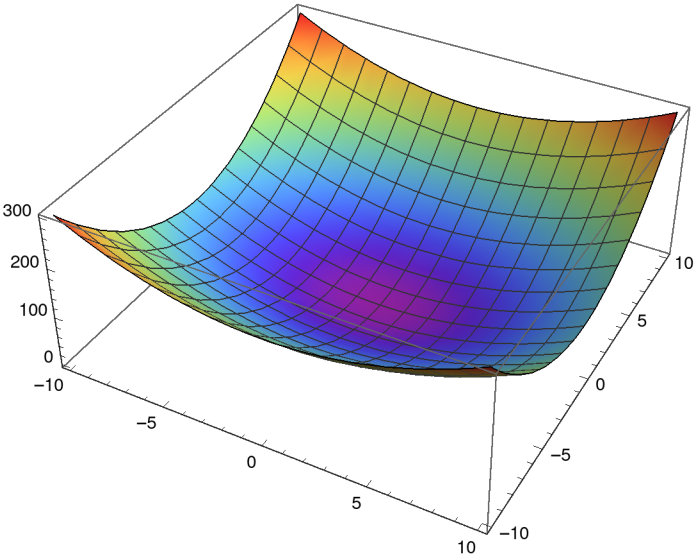
Out[ ]=



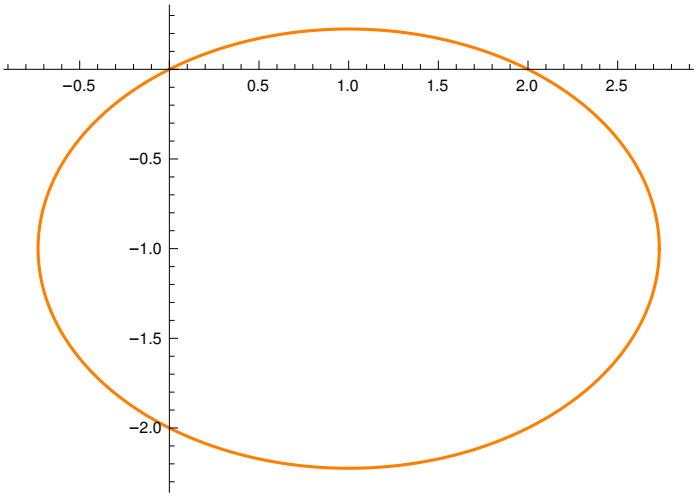
In[ ]:=
```
f = x^2 + 2 y^2
Plot3D[f, {x, -10, 10}, {y, -10, 10}]
g = ParametricPlot[{1 + Sqrt[3] Cos[u], -1 + Sqrt[3] / Sqrt[2] Sin[u]}, {u, 0, 2 Pi}]
Show[ContourPlot[f, {x, -3, 3}, {y, -3, 3}, AspectRatio → Automatic], ParametricPlot[
  {1 + Sqrt[3] Cos[u], -1 + Sqrt[3] / Sqrt[2] Sin[u]}, {u, 0, 2 Pi}, PlotStyle → White]]
ParametricPlot3D[{1 + Sqrt[3] Cos[u], -1 + Sqrt[3] / Sqrt[2] Sin[u],
  (1 + Sqrt[3] Cos[u])^2 + 2 (-1 + Sqrt[3] / Sqrt[2] Sin[u])^2}, {u, 0, 2 Pi}, BoxRatios → Automatic]
```

Out[ ]= $x^2 + 2\,y^2$

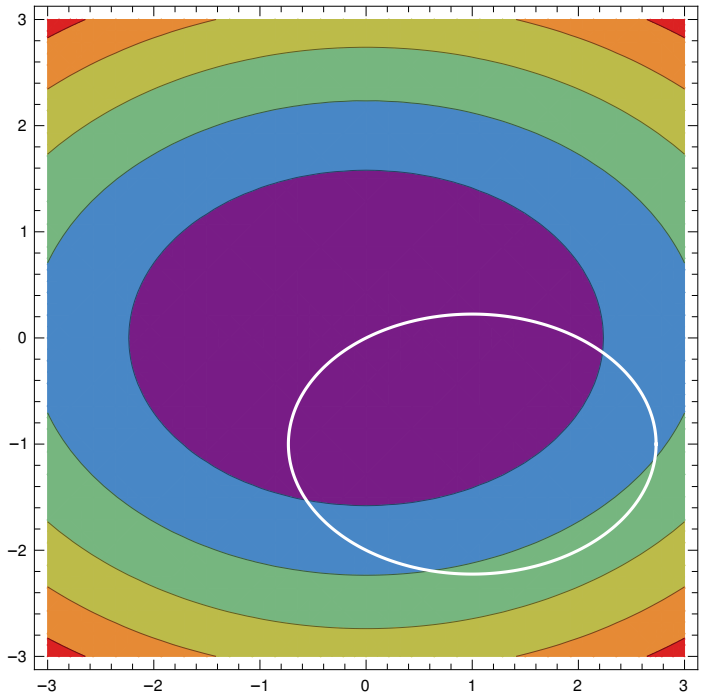
Out[ ]=



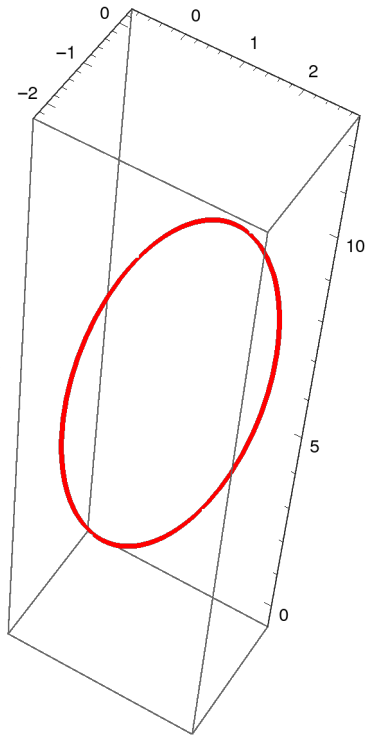
Out[ ]=



Out[ ]=



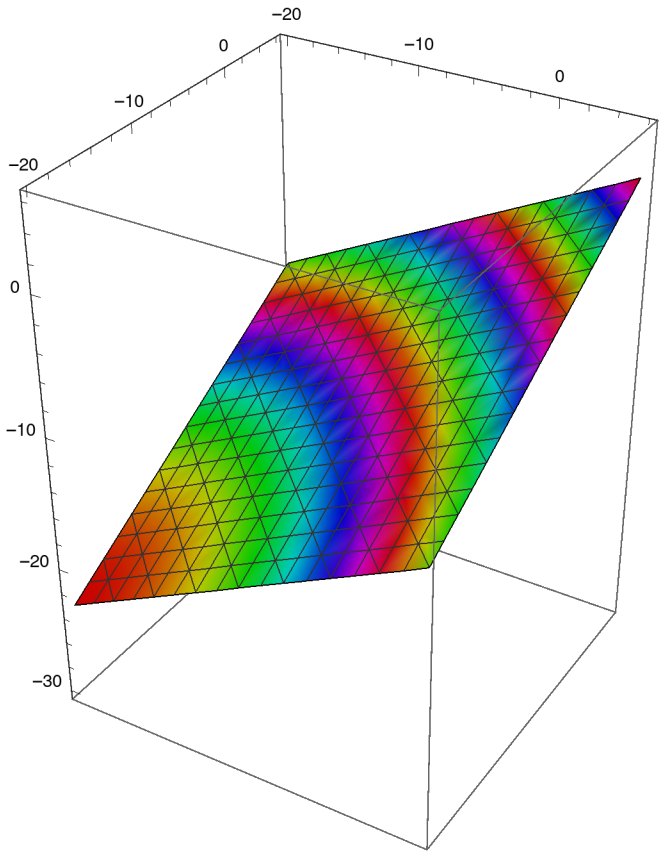
Out[ ]=



(*2*)

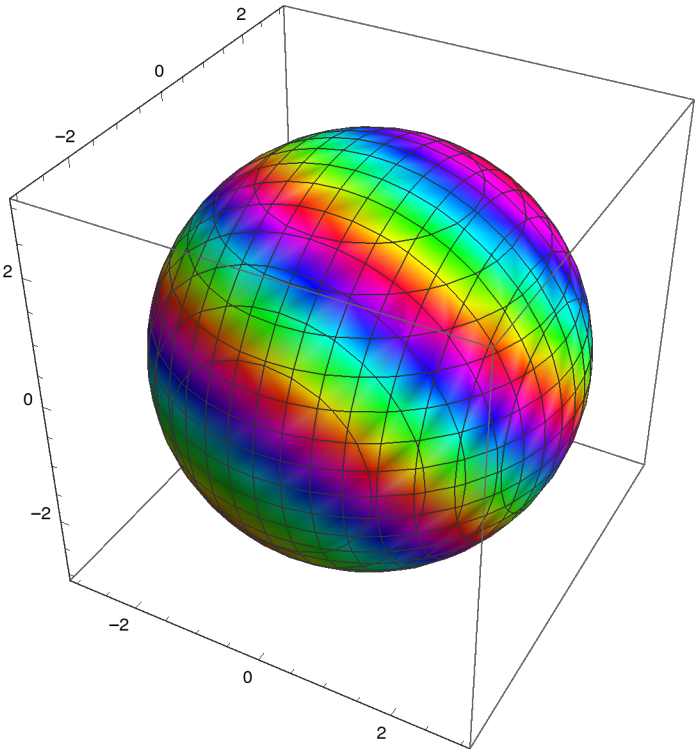
In[ ]:=
```
ContourPlot3D[x + y - 2 z == 6, {x, -20, 6}, {y, -20, 6}, {z, -30, 6},
  BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[x^2 + y^2 + z^2]]]
```

Out[ ]=



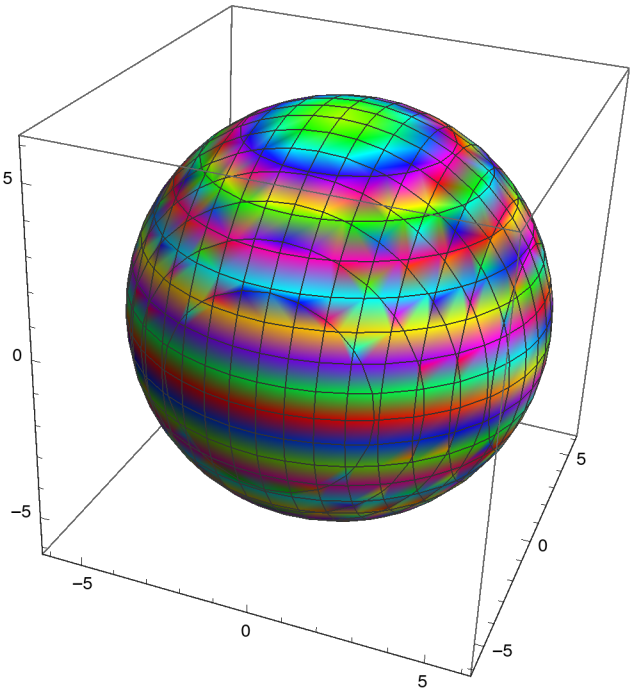
In[ ]:=
```
ContourPlot3D[x^2 + y^2 + z^2 == 9, {x, -3, 3}, {y, -3, 3}, {z, -3, 3},
  BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[x + 2 y + 2 z]]]
```

Out[ ]=



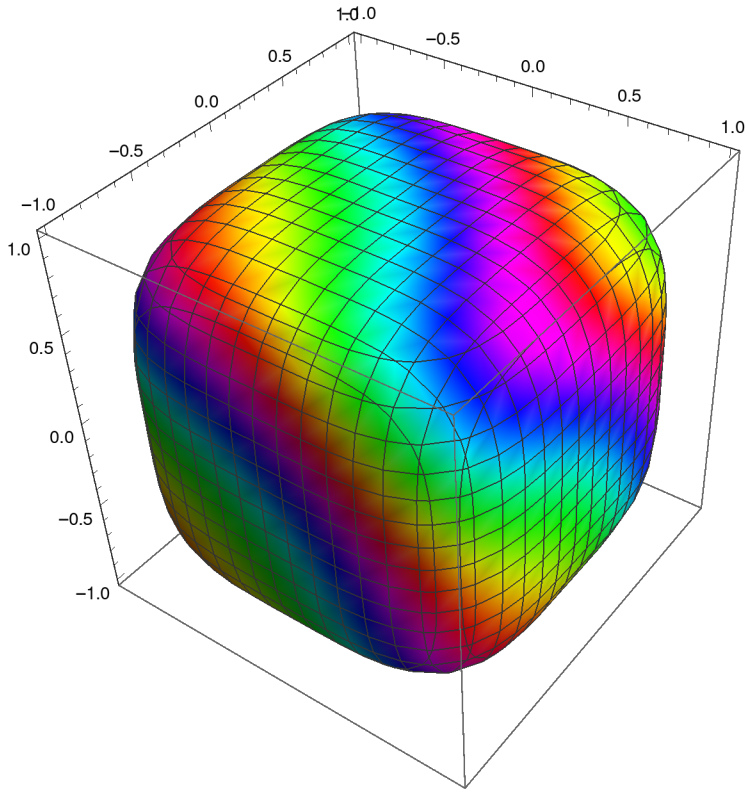
In[ ]:=
```
ContourPlot3D[x^2 + y^2 + z^2 == 36, {x, -6, 6}, {y, -6, 6}, {z, -6, 6},
  BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[y^2 - 10 z]]]
```

Out[ ]=



In[ ]:=
```
ContourPlot3D[x^4 + y^4 + z^4 == 1, {x, -1, 1}, {y, -1, 1}, {z, -1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[y^2 + x^2 + z^2]]]
```

Out[ ]=




```
(*3*)
```

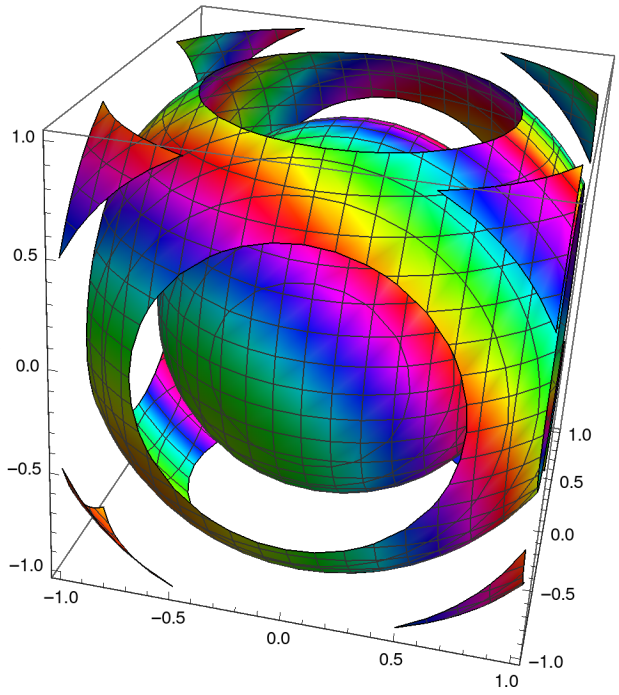
In[ ]:=
```
f = x^2 + 2 y^2 + z^2
a = x + 2 y + 3 z - 1
b = x - 2 y + z - 5
ContourPlot3D[x^2 + y^2 + z^2, {x, -1, 1}, {y, -1, 1}, {z, -1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[a == 0, {x, -1, 1}, {y, -1, 1}, {z, -1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[b == 0, {x, -1, 1}, {y, -1, 1}, {z, 2, 5},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[{a == 0, b == 0}, {x, -2, 2}, {y, -2, 2}, {z, -1, 3}, BoxRatios → Automatic]
ContourPlot3D[{a == 0, b == 0}, {x, -2, 2}, {y, -2, 2},
 {z, -1, 3}, ContourStyle → Opacity[0], Mesh → None,
 BoundaryStyle → {1 → None, 2 → None, {1, 2} → {{Green, Tube[.03]}}}, Boxed → False]
```

Out[ ]= $x^2 + 2\,y^2 + z^2$

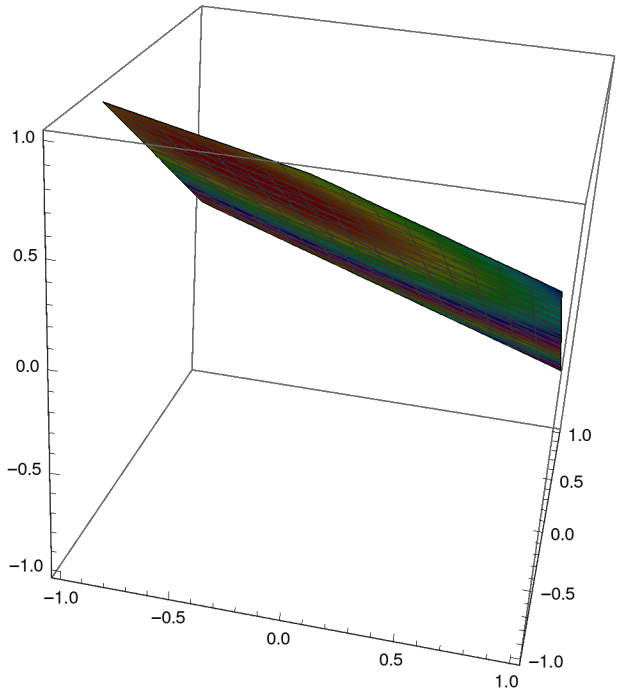
Out[ ]= $-1 + x + 2\,y + 3\,z$

Out[ ]= $-5 + x - 2\,y + z$

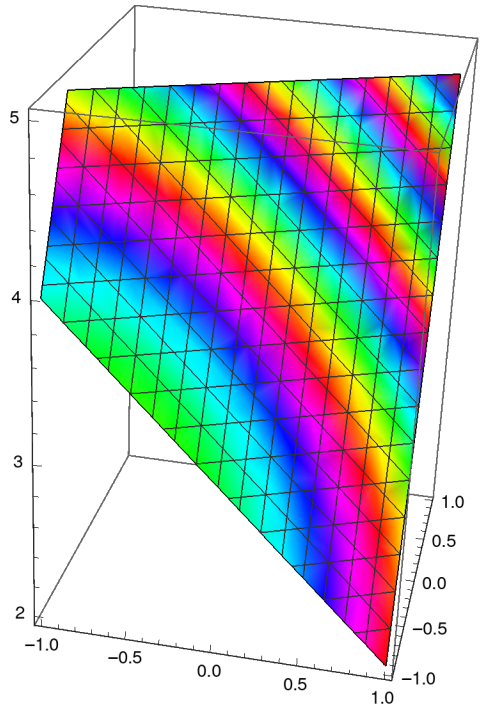
Out[ ]=



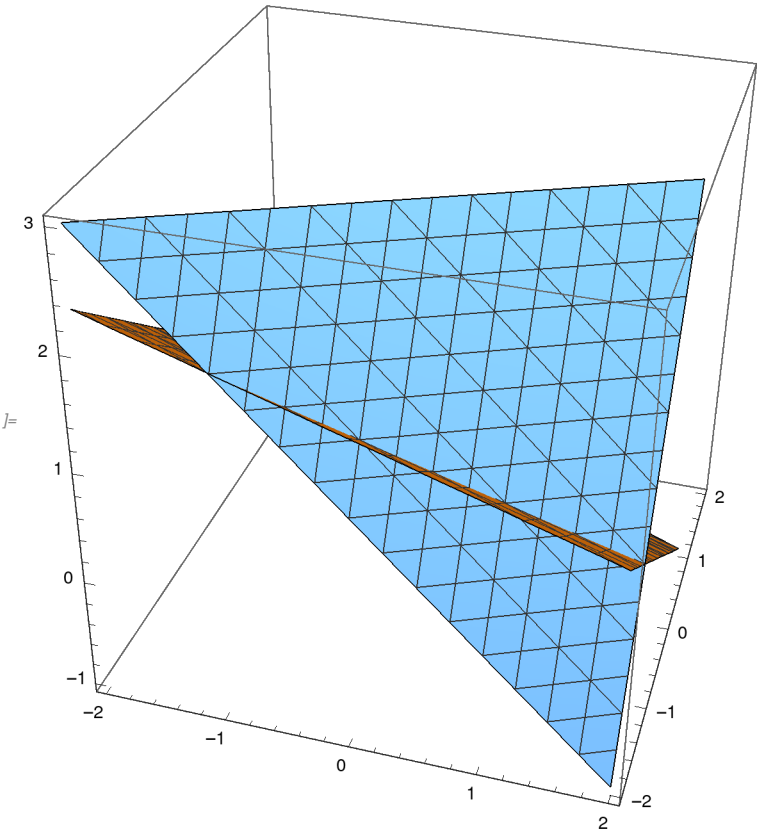
Out[ ]=



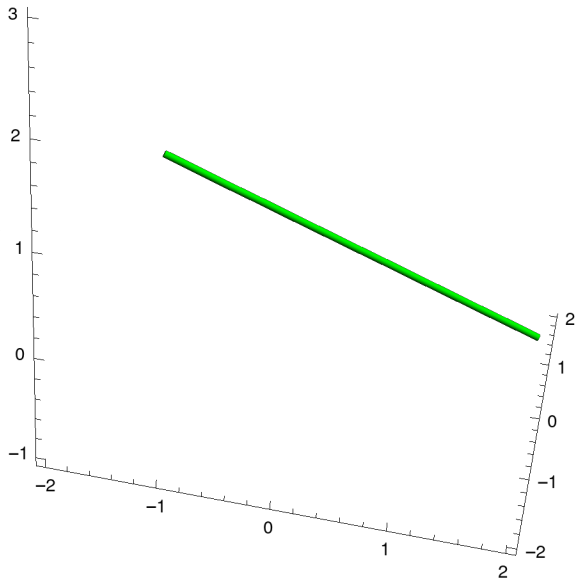
Out[ ]=



Out[ ]=



Out[ ]=



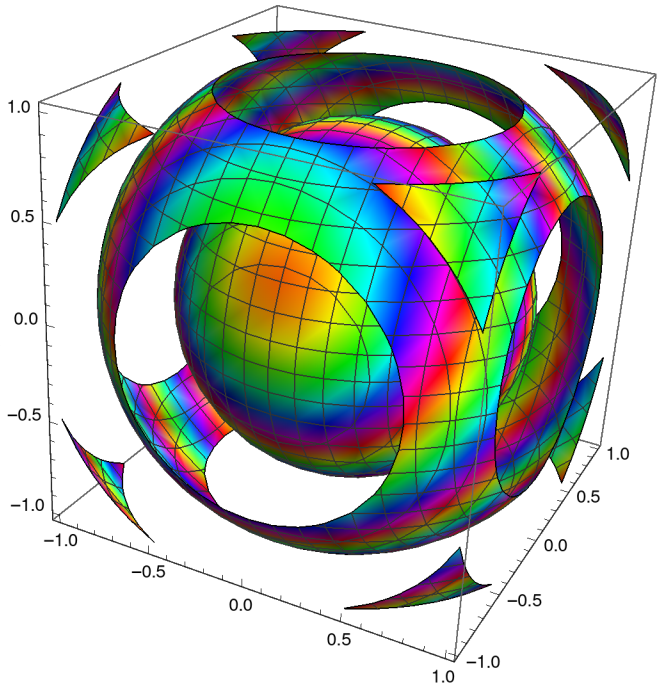
In[ ]:=
```
f = 4 y - 2 z
a = x^2 + y^2 - 1
b = 2 x - y - z - 2
ContourPlot3D[x^2 + y^2 + z^2, {x, -1, 1}, {y, -1, 1}, {z, -1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[a == 0, {x, -1, 1}, {y, -1, 1}, {z, -1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[b == 0, {x, -2, 2}, {y, -2, 2}, {z, -1, 3},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[{a == 0, b == 0}, {x, -2, 2}, {y, -2, 2}, {z, -3, 3}, BoxRatios → Automatic]
ContourPlot3D[{a == 0, b == 0}, {x, -2, 2}, {y, -2, 2},
 {z, -5, 3}, ContourStyle → Opacity[0], Mesh → None,
 BoundaryStyle → {1 → None, 2 → None, {1, 2} → {{Green, Tube[.03]}}}, Boxed → False]
```

Out[ ]= $4\,y - 2\,z$

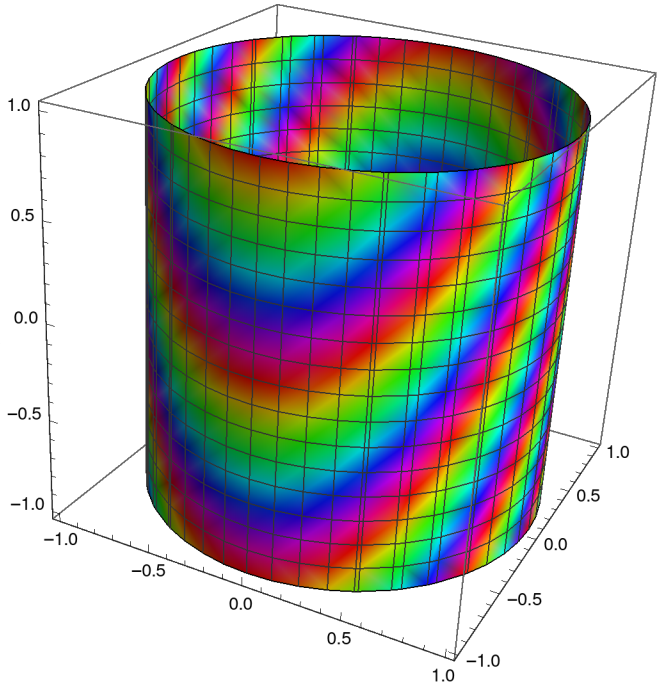
Out[ ]= $-1 + x^2 + y^2$

Out[ ]= $-2 + 2\,x - y - z$

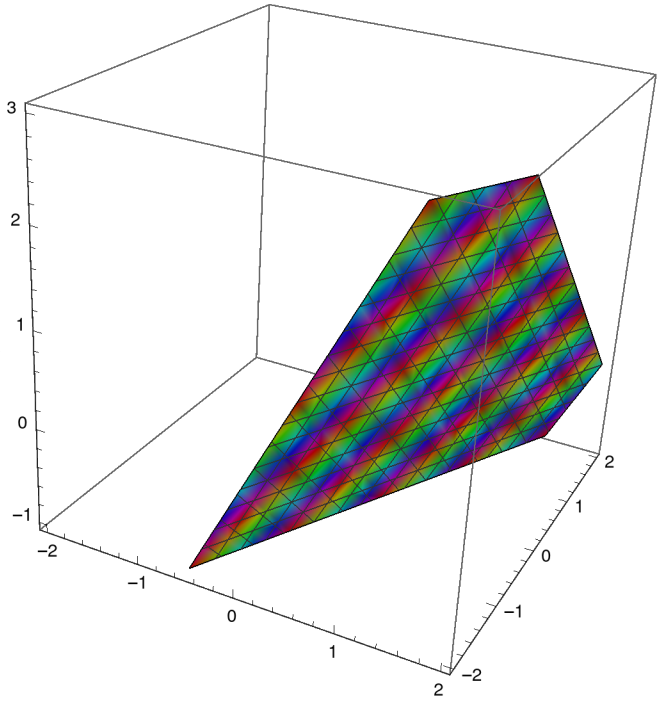
Out[ ]=


1.0
0.5
0.0
−0.5
−1.0
−1.0
−0.5
0.0
0.5
1.0
1.0
0.5
0.0
−0.5
−1.0

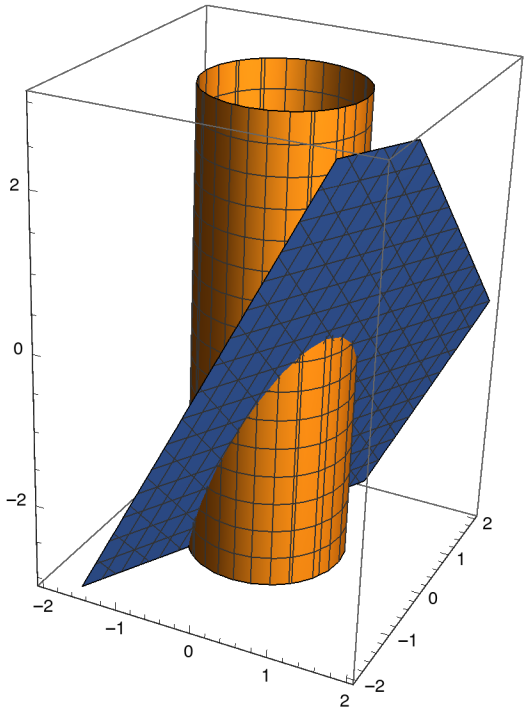
Out[ ]=


1.0
0.5
0.0
−0.5
−1.0
−1.0
−0.5
0.0
0.5
1.0
1.0
0.5
0.0
−0.5
−1.0

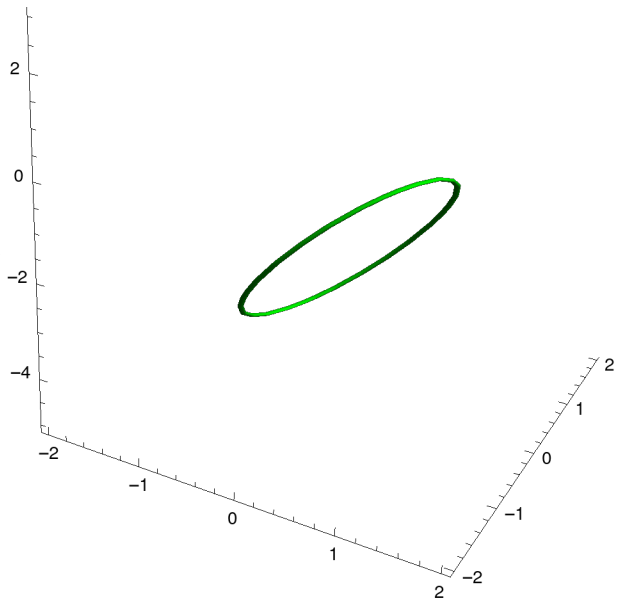
Out[ ]=



Out[ ]=



Out[ ]=



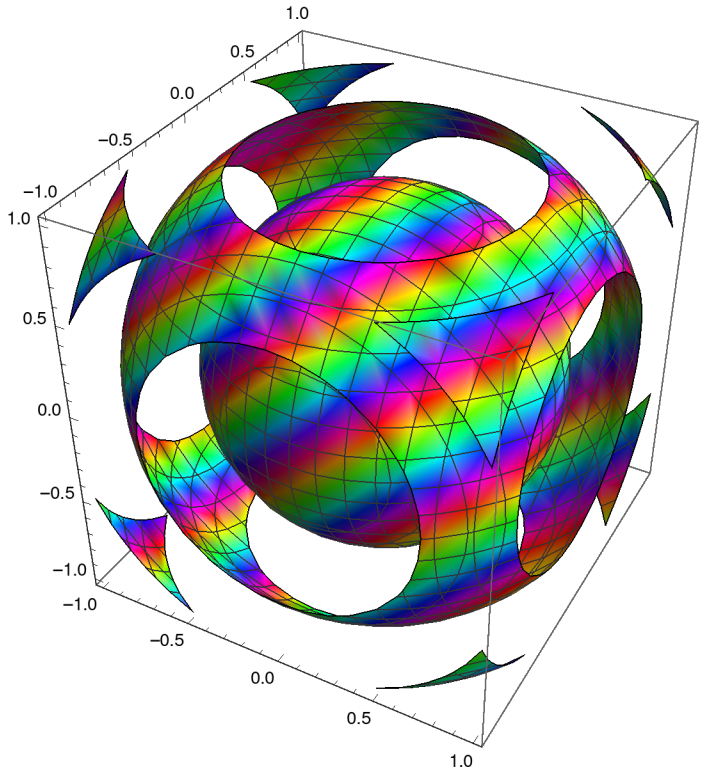
In[ ]:=
```
f = 3 x − y − 3 z
a = x^2 + 2 z^2 − 1
b = x + y − z
ContourPlot3D[x^2 + y^2 + z^2, {x, −1, 1}, {y, −1, 1}, {z, −1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[a == 0, {x, −1, 1}, {y, −1, 1}, {z, −1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[b == 0, {x, −1, 1}, {y, −2, 2}, {z, −1, 3},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[{a == 0, b == 0}, {x, −2, 2}, {y, −2, 2}, {z, −1, 3}, BoxRatios → Automatic]
ContourPlot3D[{a == 0, b == 0}, {x, −2, 2}, {y, −2, 2},
 {z, −1, 3}, ContourStyle → Opacity[0], Mesh → None,
 BoundaryStyle → {1 → None, 2 → None, {1, 2} → {{Green, Tube[.03]}}}, Boxed → False]
```

Out[ ]= $3\,x - y - 3\,z$

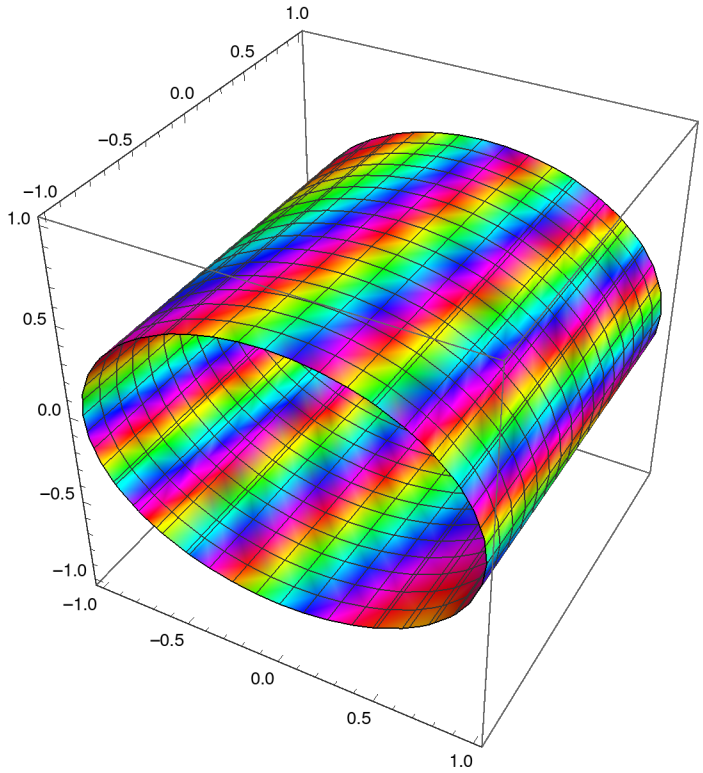
Out[ ]= $-1 + x^2 + 2\,z^2$

Out[ ]= $x + y - z$

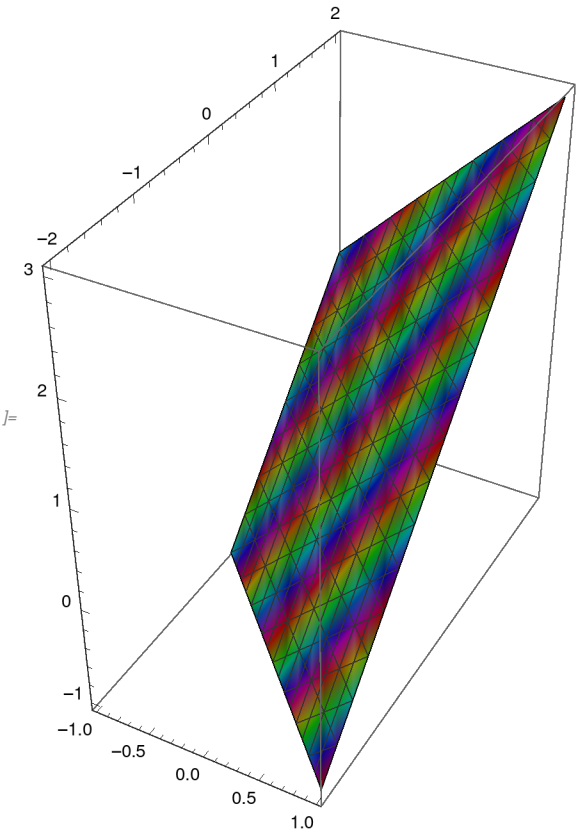
Out[ ]=


1.0
0.5
0.0
−0.5
−1.0
1.0
0.5
0.0
−0.5
−1.0
−1.0
−0.5
0.0
0.5
1.0

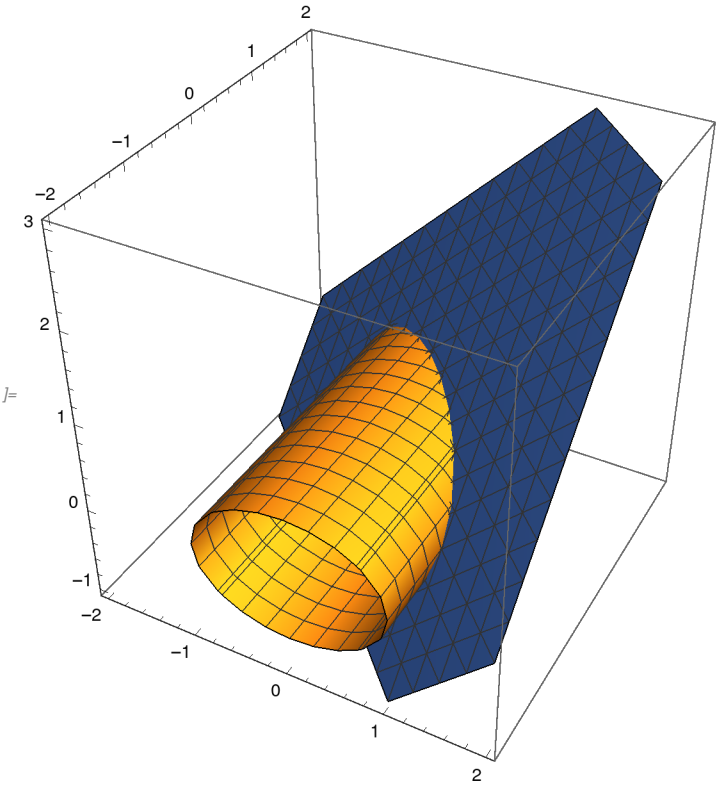
Out[ ]=


1.0
0.5
0.0
−0.5
−1.0
1.0
0.5
0.0
−0.5
−1.0
−1.0
−0.5
0.0
0.5
1.0

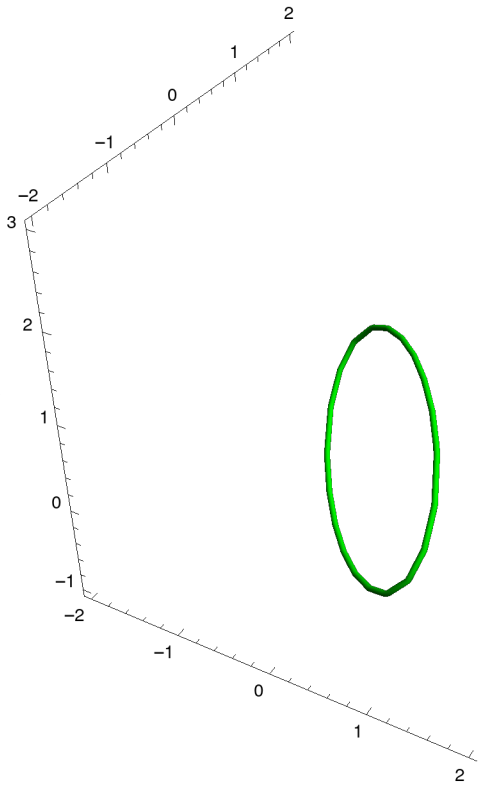
Out[ ]=



Out[ ]=



Out[ ]=



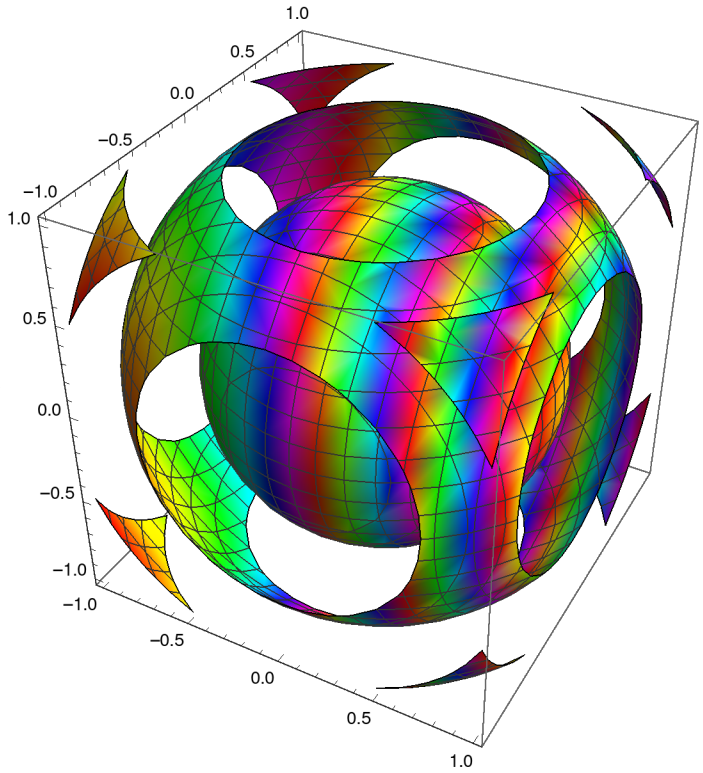
In[ ]:=
```
f = 3 x^2 + y
a = x^2 + z^2 - 9
b = 4 x - 3 y - 9
ContourPlot3D[x^2 + y^2 + z^2, {x, -1, 1}, {y, -1, 1}, {z, -1, 1},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[a == 0, {x, -3, 3}, {y, -3, 3}, {z, -3, 3},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[b == 0, {x, -3, 3}, {y, -3, 3}, {z, -3, 3},
 BoxRatios → Automatic, ColorFunction → Function[{x, y, z}, Hue[f]]]
ContourPlot3D[{a == 0, b == 0}, {x, -3, 3}, {y, -3, 3}, {z, -3, 3}, BoxRatios → Automatic]
ContourPlot3D[{a == 0, b == 0}, {x, -7, 3}, {y, -9, 3},
 {z, -3, 3}, ContourStyle → Opacity[0], Mesh → None,
 BoundaryStyle → {1 → None, 2 → None, {1, 2} → {{Green, Tube[.03]}}}, Boxed → False]
```

Out[ ]= $3 x^2 + y$

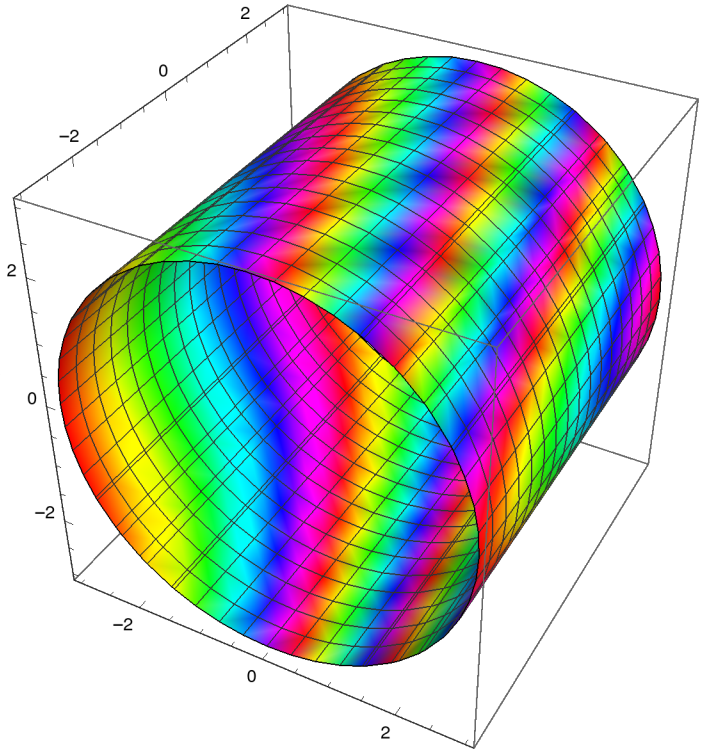
Out[ ]= $-9 + x^2 + z^2$

Out[ ]= $-9 + 4 x - 3 y$

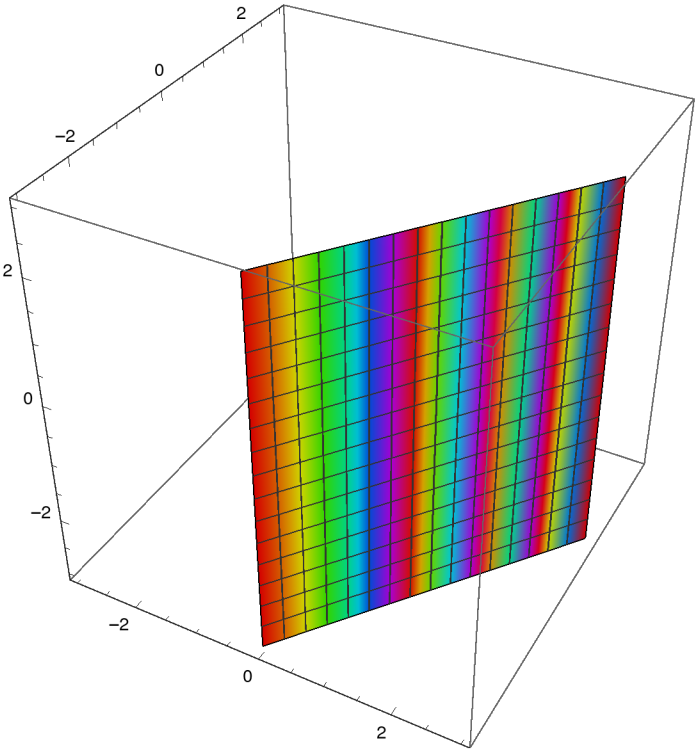
Out[ ]=



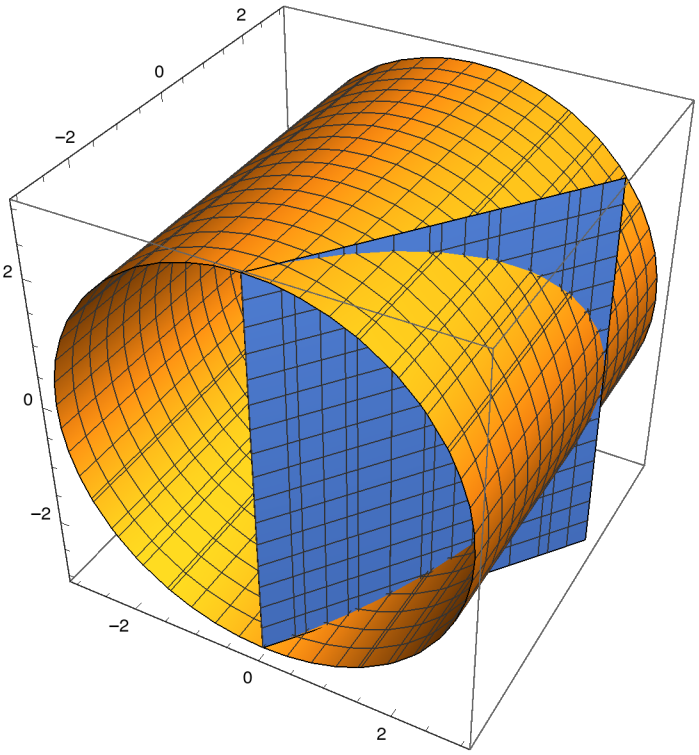
Out[ ]=



Out[ ]=



Out[ ]=



Out[ ]=