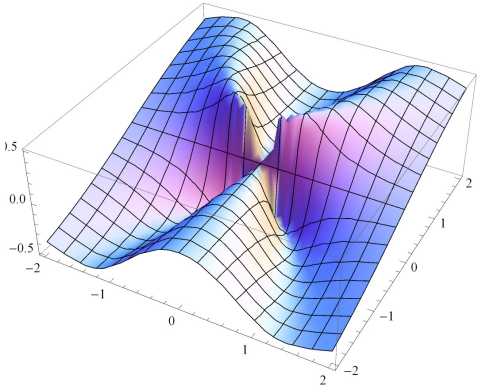
In[1]:= $f[x\_, y\_] := \frac{x^2 y}{x^4 + y^2}$

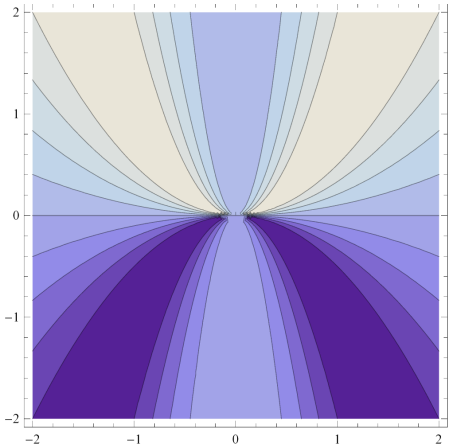
In[2]:=
```
Plot3D[f[x, y], {x, -2, 2}, {y, -2, 2}]
```

Out[2]=



In[3]:=
```
ContourPlot[f[x, y], {x, -2, 2}, {y, -2, 2}]
```

Out[3]=



In[4]:=
```
f[x_, y_] := x y^2 + Sin[x] + Log[y]
```

In[5]:=
```
f[0, 1]
```

Out[5]= 0

In[6]:=
```
D[f[x, y], x] /. {x → 0, y → 1}
```

Out[6]= 2

In[7]:=
```
D[f[x, y], y] /. {x → 0, y → 1}
```

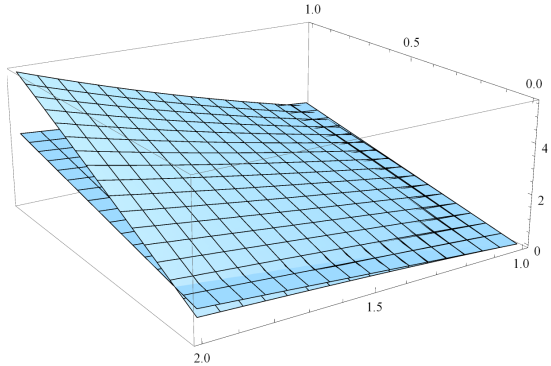
Out[7]= 1

In[8]:=
```
z = Expand[0 + 2 (x - 0) + 1 (y - 1)]
```

Out[8]= $-1 + 2x + y$

In[9]:=
```
p1 = Plot3D[{f[x, y], z}, {x, 0, 1}, {y, 1, 2}, PlotRange → All]
```

Out[9]=

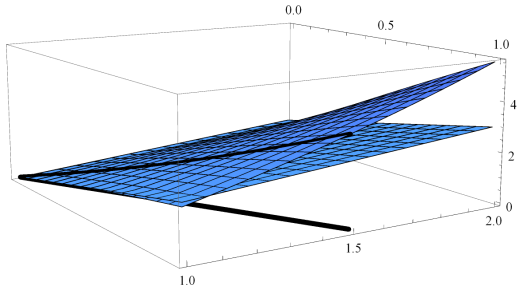


In[10]:=
```
p2 = ParametricPlot3D[{x, 1 / 2 (x - 0) + 1, 0}, {x, 0, 1}, PlotStyle → Thickness[0.01]];
```

In[11]:=
```
p3 = ParametricPlot3D[
   {x, 1 / 2 (x - 0) + 1, f[x, 1 / 2 x + 1]}, {x, 0, 1}, PlotStyle → Thickness[0.01]];
```

In[12]:=
```
Show[p1, p2, p3]
```

Out[12]=



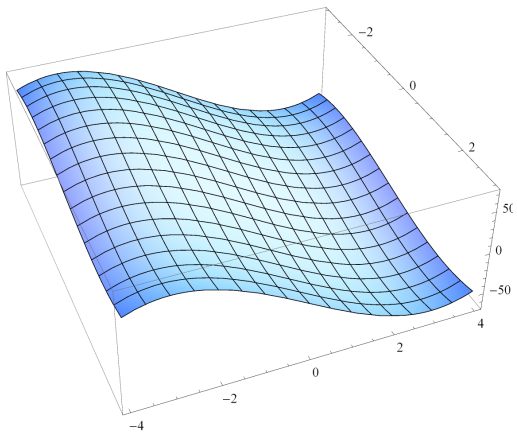
In[13]:=
```
f[x_, y_] := x^3 - 12 x + y^3 - 27 y + 3
```

In[14]:=
```
Solve[{D[f[x, y], x] == 0, D[f[x, y], y] == 0}, {x, y}]
```

Out[14]= $\{\{x \to -2, y \to -3\}, \{x \to -2, y \to 3\}, \{x \to 2, y \to -3\}, \{x \to 2, y \to 3\}\}$

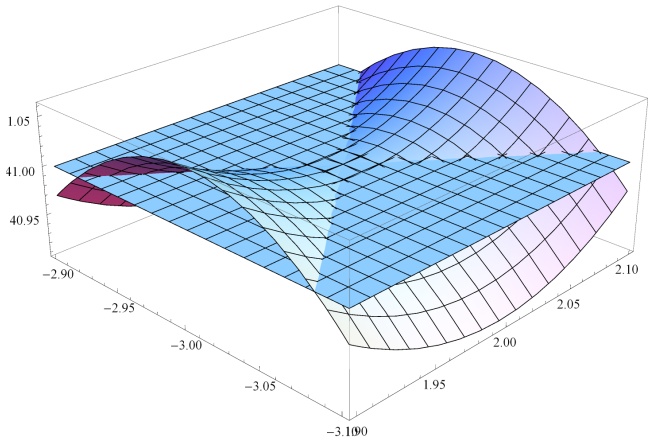
In[15]:=
```
Plot3D[f[x, y], {x, -3, 3}, {y, -4, 4}]
```

Out[15]=



In[16]:=
```
Plot3D[{f[x, y], f[2, -3]}, {x, 1.9, 2.1}, {y, -3.1, -2.9}, PlotRange → All]
```

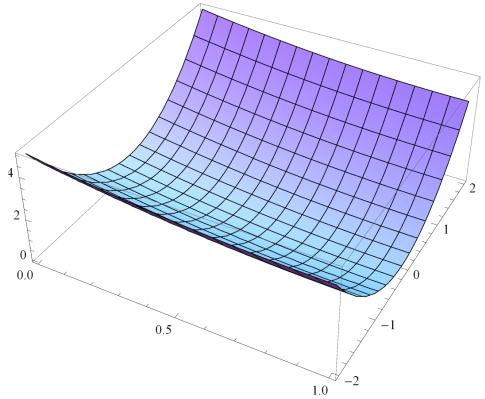
Out[16]=



In[17]:=
```
f[x_, y_] := (x - 1)^2 + (y - 0)^2
```


In[18]:=
```
p1 = Plot3D[f[x, y], {x, 0, 1}, {y, -2, 2}]
```

Out[18]=



In[19]:=
```
g[x_, y_] := y^2 - 4 x
```

In[20]:=
```
p2 = ParametricPlot3D[{y^2 / 4, y, 0}, {y, -2, 2}, PlotStyle → Thickness[0.01]];
```

In[21]:=
```
p3 = ParametricPlot3D[{y^2 / 4, y, f[y^2 / 4, y]}, {y, -2, 2}, PlotStyle → Thickness[0.01]];
```

In[22]:=
```
p4 = ParametricPlot3D[{y^2 / 4, y, f[0, 0]}, {y, -2, 2}, PlotStyle → Thickness[0.01]];
```

In[23]:=
```
Show[p1, p2, p3, p4]
```

Out[23]=