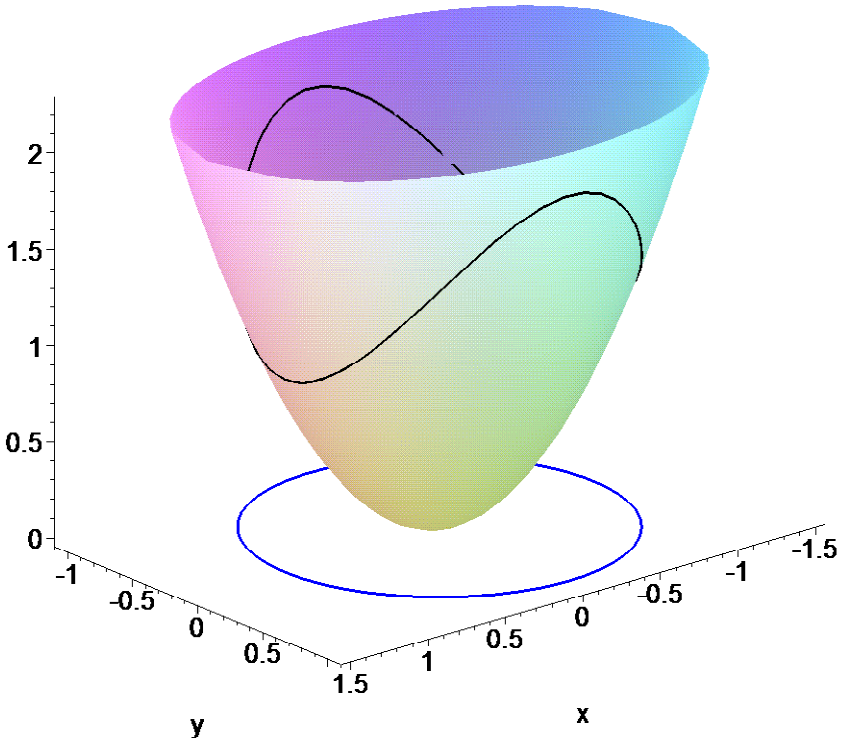
We examine the extreme values of x^2 + 2y^2 over the disk of radius one.

```
> with(plots):
> f:= x^2 + 2*y^2;
```

$$f := x^2 + 2\,y^2$$

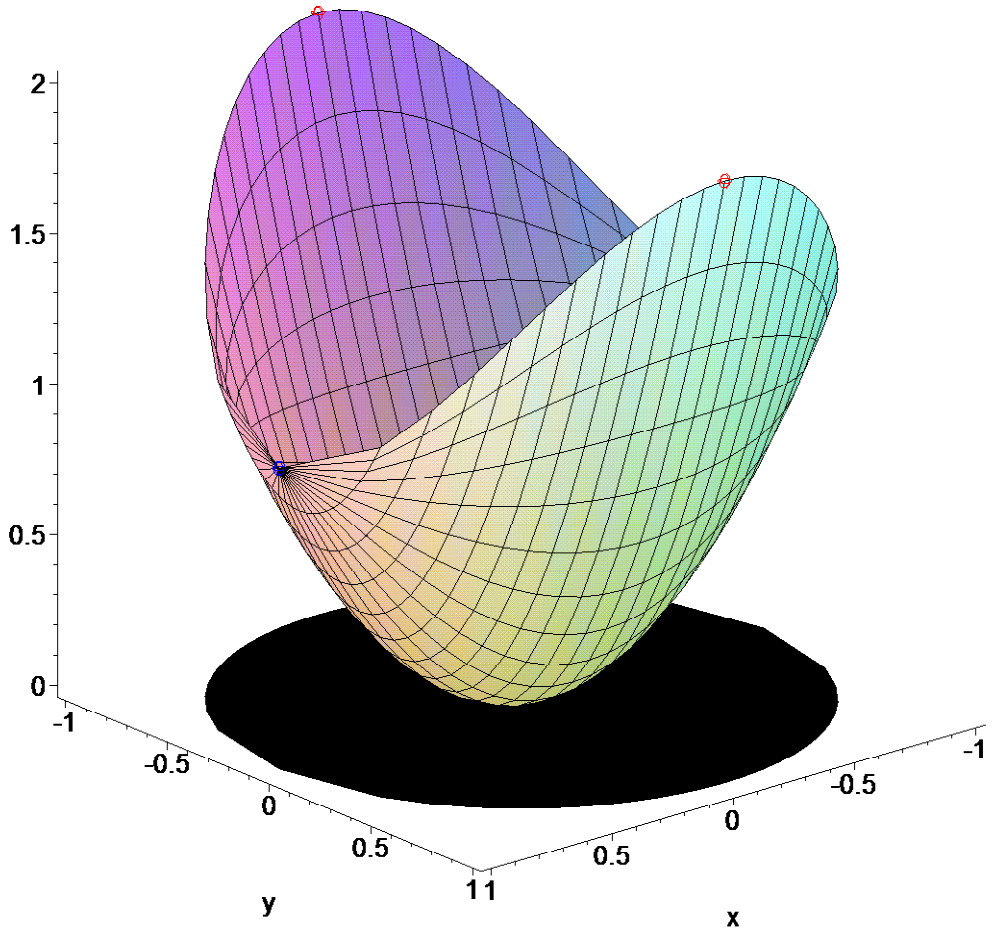
```
> r:=1.5:
> A:=plot3d(f,x=-r..r,y=-sqrt(r^2-x^2)/sqrt(2)..sqrt(r^2-x^2)/sqrt(2
  ),axes=framed,style=patchnogrid): #plotting the curface over an
  ellipse to make the top look flat.
> B:=spacecurve([cos(t),sin(t),0],t=0..2*Pi,color=blue,
  thickness=3): #circle in the xy-plane
> C:=spacecurve([cos(t),sin(t),(cos(t))^2 +
  2*(sin(t))^2],t=0..2*Pi,color=black, thickness=3): #cuve on the
  surface above the circle in the xy-plane
> display(A,B,C, scaling=constrained,title="walking around the blue
  curve loking for the maximum", orientation=[50,70]);
```

walking around the blue curve loking for the maximum



Now for a fifferent view of the same thing.

```
> a:=plot3d(f,x=-1..1,y=-sqrt(1-x^2)..sqrt(1-x^2),axes=framed):
  #Note how we are plotting the surface over the disk of radius 1
> b:=plot3d(0,x=-1..1,y=-sqrt(1-x^2)..sqrt(1-x^2),color=black):
  #this plots the disk of radius one in the xy-plane
> c:=pointplot3d({[1,0,1],[-1,0,1]},axes=framed,color=blue,symbol=ci
  rcle):
> d:=pointplot3d({[0,1,2],[0,-1,2]},axes=framed,color=red,symbol=cir
  cle):
> display({a,b,c,d}, scaling=constrained, orientation=[50,70]);
```



The blue balls are at the minima on the boundary. The red balls are at the maxima on the boundary. The absolute minimum is f=0 which occurs at (0,0). The absolute maximum is f=2 which occurs at (0,-1) and (0,1).