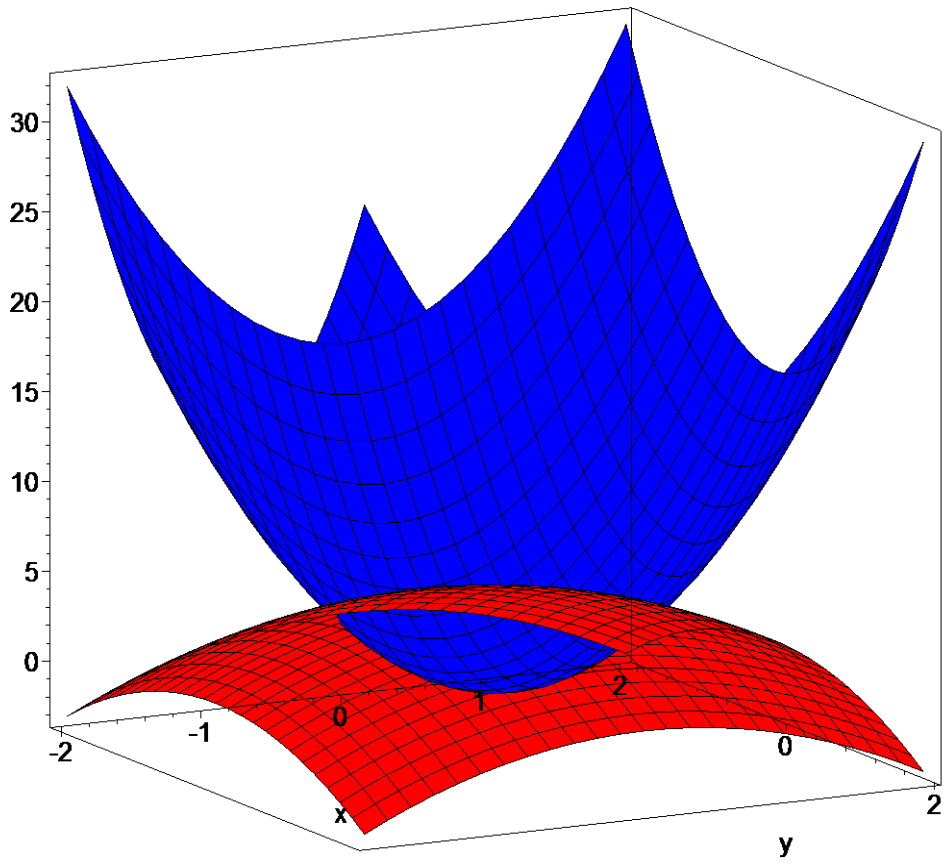
```
> with(student):
  with(plots):# solutions hw P 1127 EX 59
Warning, the name changecoords has been redefined

>
> #59
>



> P1:=plot3d(5-x^2-y^2, x= -2 .. 2,y=-2 .. 2,color =
  red,style=patch,axes = boxed):

> P2:=plot3d(4*x^2+4*y^2, x= -2 .. 2,y=-2 .. 2,color =
  blue,style=patch,axes = boxed):

> display3d(P1,P2);
```




```
> Int(Int(Int(1, z = 4*x^2+4*y^2..5-x^2-y^2),y=-sqrt(1-x^2) ..
  sqrt(1-x^2)), x=-1..1)
  = int(int(int(1, z = 4*x^2+4*y^2..5-x^2-y^2),y=-sqrt(1-x^2) ..
  sqrt(1-x^2)), x=-1..1) ;evalf(%);
```

$$\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}}\int_{4x^2+4y^2}^{5-x^2-y^2} 1\,dz\,dy\,dx = \frac{5\pi}{2}$$

$$\int_{-1.}^{1.}\int_{-1.\sqrt{1.-1.x^2}}^{\sqrt{1.-1.x^2}}\int_{4.x^2+4.y^2}^{5.-1.x^2-1.y^2} 1.\,dz\,dy\,dx = 7.853981635$$

```
> Int(Int(Int(r, z = 4*r^2..5-r^2),r=0 .. 1), theta = 0..2*Pi)
  = int(int(int(r, z = 4*r^2..5-r^2),r=0 .. 1), theta = 0..2*Pi);
  evalf(%);
```

$$\int_0^{2\pi}\int_0^{1}\int_{4r^2}^{5-r^2} r\,dz\,dr\,d\theta = \frac{5\pi}{2}$$

$$7.853981634 = 7.853981635$$

```
> phi0:= arctan(.25):
> Int(Int(Int(rho^2*sin(phi), rho =
  0..(-cos(phi)+sqrt(1+19*(sin(phi))^2))/(2*(sin(phi))^2)),phi=0 ..
  phi0), theta = 0..2*Pi)+Int(Int(Int(rho^2*sin(phi), rho = 0 ..
  csc(phi)*cot(phi)/4),phi= phi0..Pi/2), theta =
  0..2*Pi)=int(int(int(rho^2*sin(phi), rho =
  0..(-cos(phi)+sqrt(1+19*(sin(phi))^2))/(2*(sin(phi))^2)),phi=0 ..
  phi0), theta = 0..2*Pi)+int(int(int(rho^2*sin(phi), rho = 0 ..
  csc(phi)*cot(phi)/4),phi= phi0..Pi/2), theta = 0..2*Pi);
  ;
```

$$\int_0^{2\pi}\int_0^{0.2449786631}\int_0^{1/2\,\frac{-\cos(\phi)+\sqrt{1+19\sin(\phi)^2}}{\sin(\phi)^2}} \rho^2\sin(\phi)\,d\rho\,d\phi\,d\theta + \int_0^{2\pi}\int_{0.2449786631}^{\frac{\pi}{2}}\int_0^{1/4\csc(\phi)\cot(\phi)} \rho^2\sin(\phi)\,d\rho\,d\phi\,d\theta = 7.853981634$$

```
> 
> 
```