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> restart:with(student):with(plots):
```

```
Warning, the name changecoords has been redefined
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```
> g:= (x,y) -> 40 + sqrt(25-x^2-y^2);
```

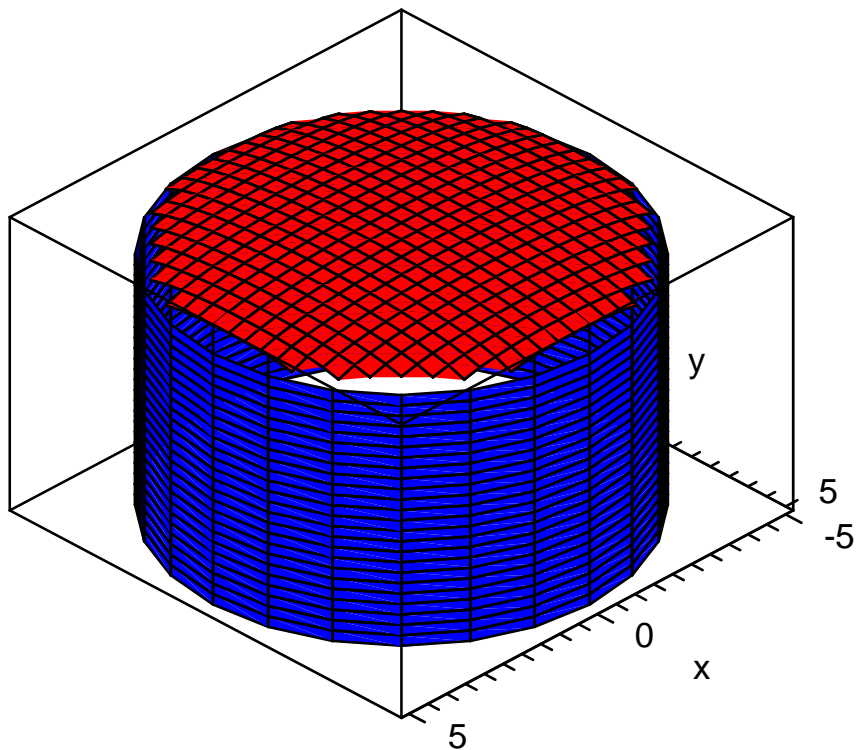
$$g := (x, y) \rightarrow 40 + \sqrt{25 - x^2 - y^2}$$

(1)

```
>
```

```
> plot1:=plot3d(g(x,y), x=-5..5, y=-5..5, axes=boxed, color=red):
```

```
plot2:=plot3d(5, theta=0..2*Pi, z=0..40, coords=cylindrical, axes=
BOXED, color=blue):display(plot1, plot2);
```



```
> 4*Int( Int(g(x,y), y=0 .. sqrt(25-x^2)), x=0..5) =4*int( int(g(x,y)
, y=0 .. sqrt(25-x^2)), x=0..5);evalf(%);
```

$$4 \int_0^5 \int_0^{\sqrt{25-x^2}} 40 + \sqrt{25-x^2-y^2} \, dy \, dx = \frac{3250}{3} \pi$$

$$3403.392041 = 3403.392041$$

(2)

```
> G:= (r,theta)-> 40 +sqrt(25-r^2);
```

$$G := (r, \theta) \rightarrow 40 + \sqrt{25 - r^2}$$

(3)

```
> 4*Int( Int(r*G(r,theta), theta=0 .. Pi/2), r=0..5) =4*int( int(r*G
(r,theta), theta=0 ..Pi/2), r=0..5);evalf(%);
```

$$4 \int_0^5 \int_0^{\frac{1}{2}\pi} r \left( 40 + \sqrt{25 - r^2} \right) d\theta dr = \frac{3250}{3} \pi$$

$$3403.392041 = 3403.392041 \quad (4)$$

> 4\*Int( Int(r\*G(r,theta), r=0 .. 5), theta=0 .. Pi/2) =4\*int( int(r\*G(r,theta), r=0 .. 5), theta=0 .. Pi/2) ;evalf(%);

$$4 \int_0^{\frac{1}{2}\pi} \int_0^5 r \left( 40 + \sqrt{25 - r^2} \right) dr d\theta = \frac{3250}{3} \pi$$

$$3403.392041 = 3403.392041 \quad (5)$$

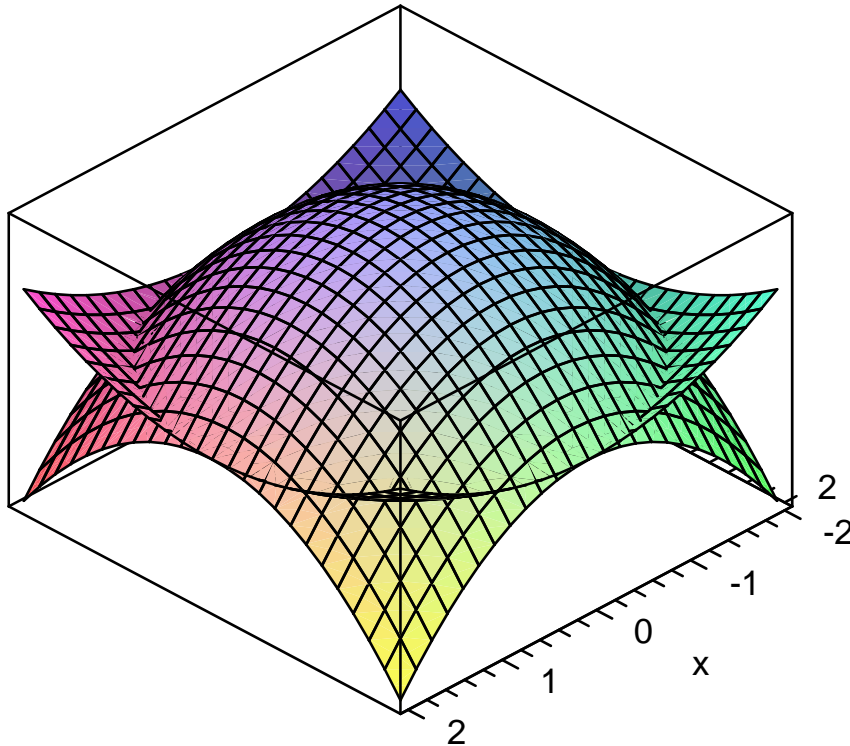
> # hen egg

> top:= (x,y) -> 6-x^2-y^2;plot1:=plot3d(top(x,y), x=-2..2, y=-2..2, axes=boxed):

$$top := (x, y) \rightarrow 6 - x^2 - y^2 \quad (6)$$

> bot:= (x,y) -> (x^2+y^2)/2;plot2:=plot3d(bot(x,y), x=-2..2, y=-2..2, axes=boxed):display(plot1,plot2);

$$bot := (x, y) \rightarrow \frac{1}{2} y^2 + \frac{1}{2} x^2$$



> 4\*Int( Int(top(x,y)-bot(x,y), y=0 .. sqrt(4-x^2)), x=0..2) =4\*int( int(top(x,y)-bot(x,y), y=0 .. sqrt(4-x^2)), x=0..2);evalf(%);

$$4 \int_0^2 \int_0^{\sqrt{4-x^2}} \left(6 - \frac{3}{2}x^2 - \frac{3}{2}y^2\right) dy dx = 12\pi$$

$$37.69911184 = 37.69911185 \quad (7)$$

> top:= (r,theta) -> 6-r^2;

> bot:=(r,theta) -> r^2/2;

$$top := (r, \theta) \rightarrow 6 - r^2$$

$$bot := (r, \theta) \rightarrow \frac{1}{2} r^2 \quad (8)$$

> Int( Int(r\*(top(r,theta)-bot(r,theta)), r=0 .. 2), theta=0..2\*Pi) =  
 int( int(r\*(top(r,theta)-bot(r,theta)), r=0 .. 2), theta=0..2\*Pi);  
 evalf(%) ;

$$\int_0^{2\pi} \int_0^2 r \left(6 - \frac{3}{2}r^2\right) dr d\theta = 12\pi$$

$$37.69911184 = 37.69911185 \quad (9)$$

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>