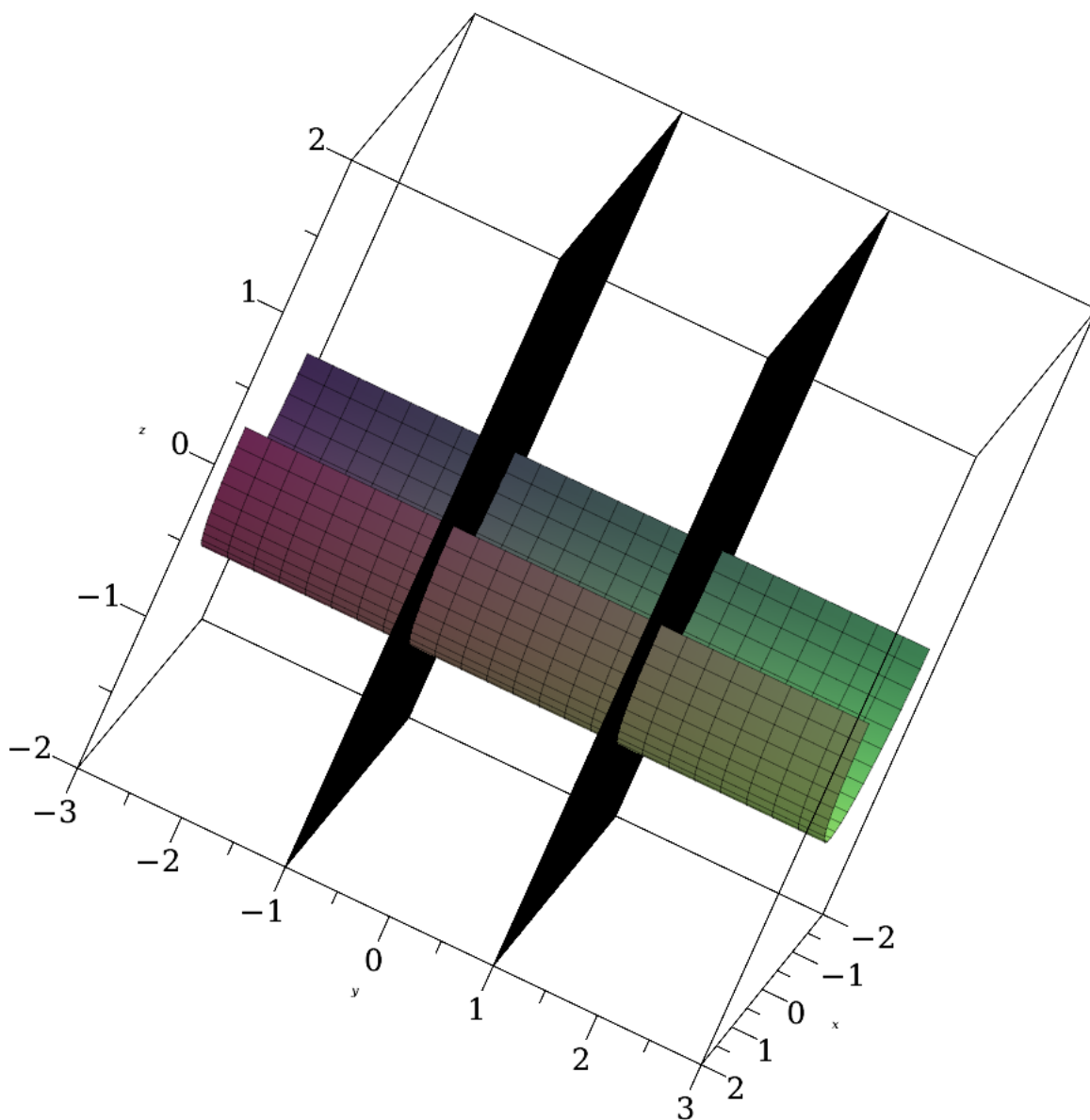


```

> restart : with(LinearAlgebra) : with(plots) : with(plottools) :
  with(VectorCalculus) : SetCoordinates(cartesian[x, y, z]) :
>
Y1 := implicitplot3d(y = 1, x = -2 .. 2, y = -1 .. 2, z = -2 .. 2, color = "Blue") :
Y2 := implicitplot3d(y = -1, x = -2 .. 2, y = -2 .. 1, z = -2 .. 2, color = "Red") :
>
> cilinder_plot := plot3d([cos(theta), y, sin(theta)], theta = Pi..2·Pi, y = -3..3) :
> display(Y1, Y2, cilinder_plot)

```



```

> # Curl of modified F

```

```

> F := VectorField([ -y^2, -x, z]) :
> curl := Curl(F)
curl := (0)e_x + (0)e_y + (-1 + 2y)e_z

```

**(1)**

```

> # Calculate the goddamn cross for dS
> v1 := VectorField([diff(cos(theta), theta), diff(y, theta), diff(sin(theta),
    theta)]) :
> v2 := VectorField([0, 1, 0]) :
> cross := CrossProduct(v1, v2)
cross := (-cos(theta))e_x + (0)e_y + (-sin(theta))e_z

```

**(2)**

```

>
> int(int(curl • cross, theta = Pi..2·Pi), y = -1 ..1)
-4

```

**(3)**