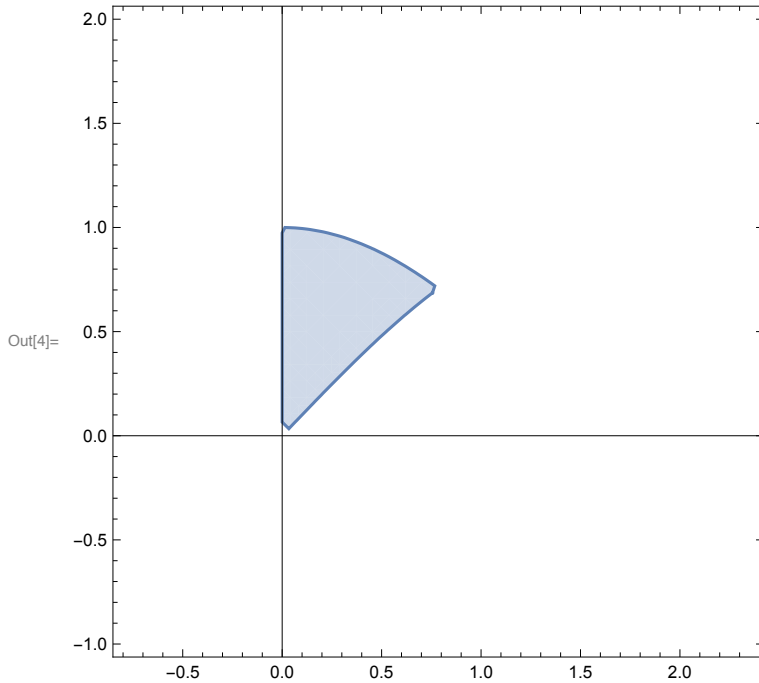


(\* Quiz 39 | AP Calculus BC | Comments / Answer Key \*)

(\* A period | Problem 1 \*)

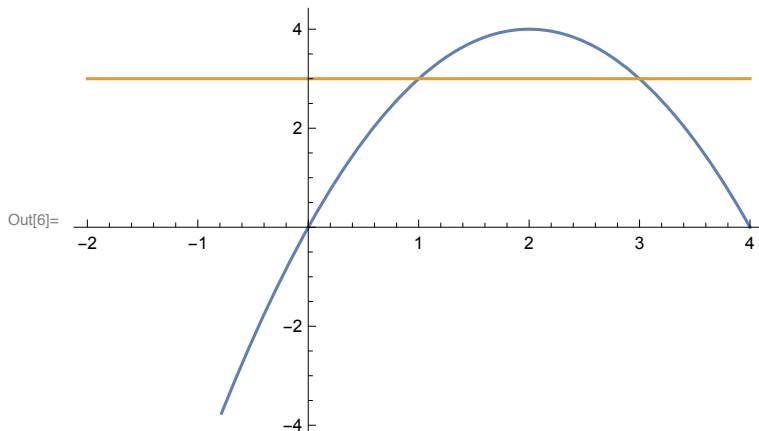
```
In[4]:= RegionPlot[Sin[x] < y < Cos[x] && 0 < x < Pi / 4,  
{x, -Pi / 4, 3 Pi / 4}, {y, -1, 2}, Axes -> True]
```



The region enclosed by the cosine and sine curves, from  $x=0$  to  $x=\pi/4$ , is revolved about the axis  $x = \pi$ . The shell method is used to set up the volume.

(\* A period | Problem 2 \*)

```
In[6]:= Plot[{4 x - x^2, 3}, {x, -2, 4}]
```



The shell method is appropriate here.  $d(x) = 2\pi(x-1)$  and  $h(x) = 4x - x^2 - 3$ , on the interval  $[1, 3]$ .

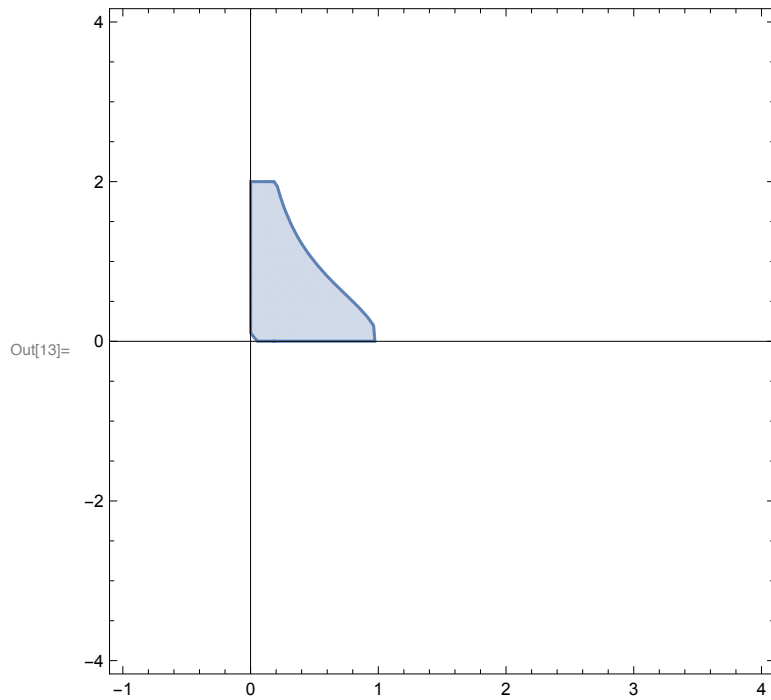
```
In[7]:= Integrate[2 Pi (x - 1) (4 x - x^2 - 3), {x, 1, 3}]
```

Out[7]=  $\frac{8\pi}{3}$

(\* F period | Problem 1 \*)

Rewrite the integral to identify:  $d(y) = 2\pi y$  and  $h(y) = 1/(1+y^2)$ .

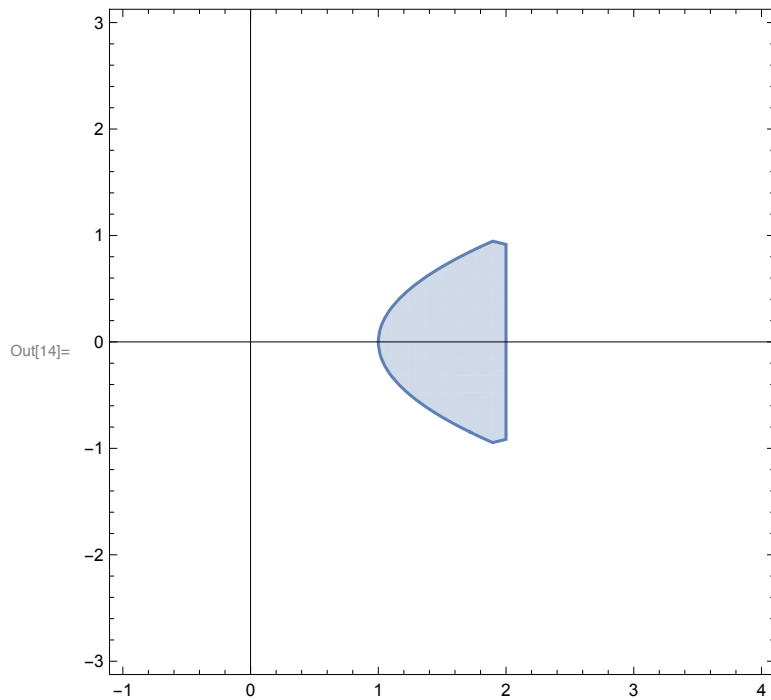
In[13]:= **RegionPlot**[ $0 < x < 1 / (1 + y^2)$  &&  $0 < y < 2$ , {x, -1, 4}, {y, -4, 4}, Axes → True]



The solid is obtained by the revolving the shaded region above, about the x-axis.

(\* F period | Problem 2 \*)

In[14]:= **RegionPlot**[ $y^2 + 1 < x < 2$ , { $x$ , -1, 4}, { $y$ , -3, 3}, Axes → True]



The shell method is appropriate.  $d(y) = 2\pi(y + 2)$  and  $h(y) = 2 - (1 + y^2) = 1 - y^2$  on the interval of  $y$ -values  $[-1, 1]$ .

In[15]:= **Integrate**[ $2\pi(y + 2)(1 - y^2)$ , { $y$ , -1, 1}]

Out[15]=  $\frac{16\pi}{3}$