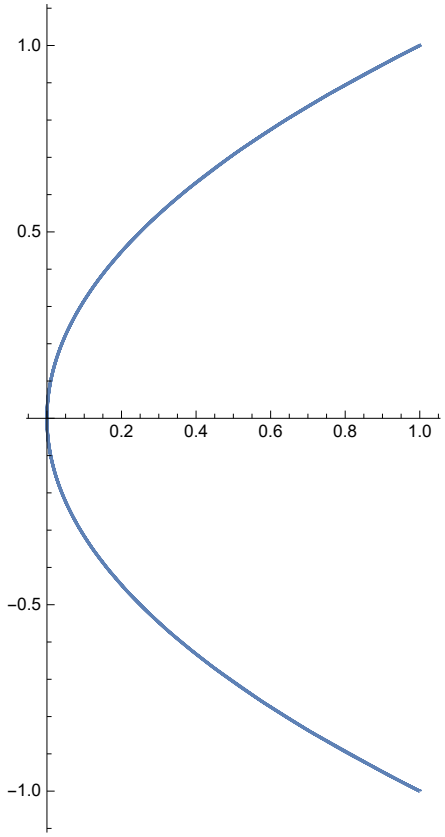
Assignment 4 No.5

(a)

In[5]:=
```
x = (Cos[t])^2
```
Out[5]=
```
Cos[t]^2
```

In[6]:=
```
y = Cos[t]
```
Out[6]=
```
Cos[t]
```

In[7]:=
```
ParametricPlot[{x, y}, {t, 0, 4 π}]
```
Out[7]=



(b)

$$L = \int_a^b \sqrt{\left(\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2\right)}\, dt$$

In[8]:=
```
D[Cos[t]^2, t]
```
Out[8]=
```
-2 Cos[t] Sin[t]
```

In[9]:=
```
D[Cos[t], t]
```
Out[9]=
$$-\text{Sin}[t]$$

In[11]:=
```
L = ∫_0^(4 π) √((-2 Cos[t] Sin[t])^2 + (-Sin[t])^2) 𝕕t // N
```
Out[11]=
```
11.8315
```

i.e, 11.8315 meters

(c)

about x axis.

S=$\int_a^b 2\,\text{Pi}\,y\,ds$ where ds=$\sqrt{\left(\left(\frac{dx}{dt}\right)^2+\left(\frac{dy}{dt}\right)^2\right)}$

In[12]:=
```
ClearAll["Global`*"]
```

In[17]:=
```
x = a (Cos[θ])^3
```
Out[17]=
$$a\,\text{Cos}[\theta]^3$$

In[18]:=
```
y = a (Sin[θ])^3
```
Out[18]=
$$a\,\text{Sin}[\theta]^3$$

In[19]:=
```
D[a Cos[θ]^3, θ]
```
Out[19]=
$$-3\,a\,\text{Cos}[\theta]^2\,\text{Sin}[\theta]$$

In[20]:=
```
D[a Sin[θ]^3, θ]
```
Out[20]=
$$3\,a\,\text{Cos}[\theta]\,\text{Sin}[\theta]^2$$

In[23]:=
```
S = ∫_0^(π/2) 2 Pi a Sin[θ]^3 √((-3 a Cos[θ]^2 Sin[θ])^2 + (3 a Cos[θ] Sin[θ]^2)^2) 𝕕θ
```
Out[23]=
$$\frac{6}{5}\,a\,\sqrt{a^2}\,\pi$$

$\frac{6}{5}\,a\,\sqrt{a^2}\,\pi$ meter^2 (Ans.)