WEEK-3

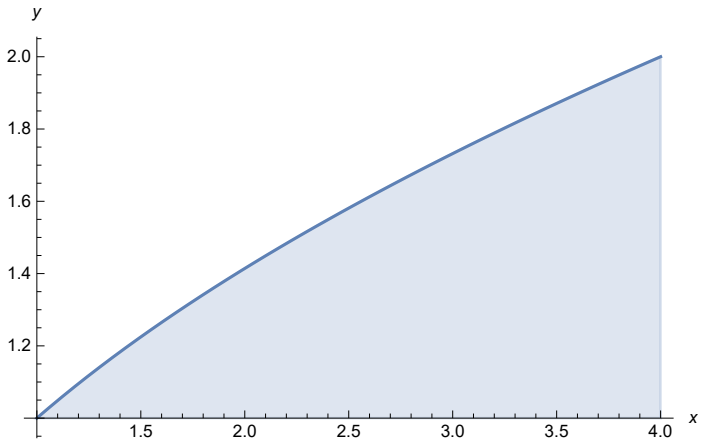
1. Find the volume of the solid that is obtained when the region under the curve y = $\sqrt{x}$ over the interval [1,4] is revolved about the x-axis.

In[100]:=
$$V = \pi \int_a^b [f(x)]^2 \, dx \; ; \; x \text{ axis}$$

In[100]:=
```
f[x_] := √x;
```

In[101]:=
```
Plot[{f[x]}, {x, 1, 4}, PlotRange → Automatic,
 PlotLegends → "Expressions", AxesLabel → {x, y}, Filling → Axis]
```

Out[101]=



In[102]:=
```
V = Pi * Integrate[(f[x])^2, {x, 1, 4}]
```

Out[102]=
$$\frac{15\,\pi}{2}$$

2. Volumes by slicing Washers:

In[103]:=
$$V1 = \pi \int_a^b \left[f[x]^2 - g[x]^2\right] dx$$

Find the volume of the solid generated when the region between the graphs of the equations f(x) = $\frac{1}{2} + x^2$ and g(x) over the interval [0,2] is revolved about the x-axis.

In[104]:=
$$V = Pi * \int_0^2 \left(\left(\frac{1}{2} + x^2\right)^2 - (x)^2\right) dx$$

Out[104]=
$$\frac{69\,\pi}{10}$$

3. Cylindrical shell

$V = \int_a^b 2\pi x[f(x) - g(x)]\,dx$; y axis

Use cylindrical shells to find the volume of the solid generated when the region enclosed between y = $\sqrt{x}$,x=1, x=4 and the x-axis is resolved about the y-axis.

In[105]:=
```
V = 2 * π * ∫_1^4 x √x dx
```

Out[105]= $\frac{124\,\pi}{5}$

4. $V = \int_c^d 2\pi y[f(y) - g(y)]\,dy$; x axis

Use cylindrical shells to find the volume of the solid generated when the region enclosed between $y^2 = x$, $y = 1$, $x = 0$ and the x-axis is resolved about the x-axis.

In[106]:=
```
V = 2 * Pi * ∫_0^1 y * y^2 dy
```

Out[106]= $\frac{\pi}{2}$