

Lab 3 Example and Hints - MATH 242

FALL 2020

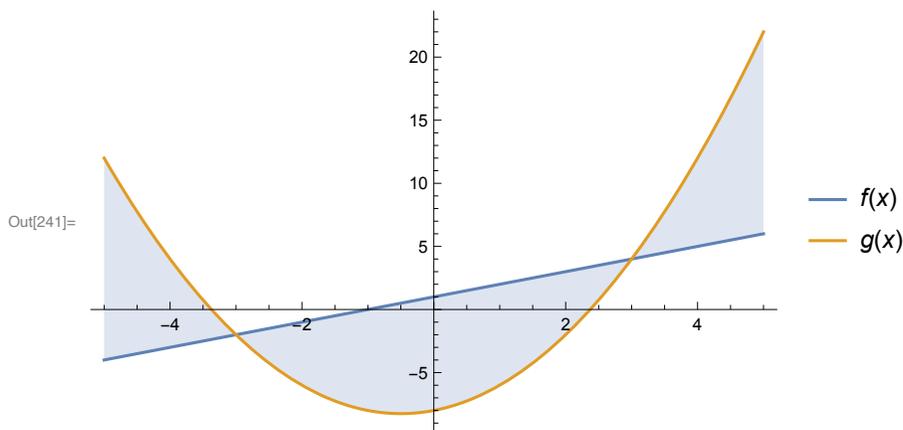
By Li - An Chen Lab Section 40 & 41

Example 1 - Regions and Areas

```
In[238]:= Clear[f, g, x]
          f[x_] = x + 1
          g[x_] = x^2 + x - 8
          Plot[{f[x], g[x]}, {x, -5, 5}, Filling -> {1 -> {2}}, PlotLegends -> "Expressions"]
```

Out[239]= $1 + x$

Out[240]= $-8 + x + x^2$



```
In[236]:= NSolve[f[x] == g[x], x, Reals]
```

Out[236]= $\{\{x \rightarrow -3.\}, \{x \rightarrow 3.\}\}$

```
In[237]:= Solve[f[x] == g[x], x, Reals]
```

Out[237]= $\{\{x \rightarrow -3\}, \{x \rightarrow 3\}\}$

```
In[7]:= Integrate[f[x] - g[x], {x, -3, 3}]
```

Out[7]= 36

Example 2 - Washer Method

```
In[242]:= Pi * Integrate[(3 - g[x])^2 - (3 - f[x])^2, {x, -3, 3}]
```

```
Out[242]:=  $\frac{2016 \pi}{5}$ 
```

```
In[243]:= Pi * Integrate[(3 - g[x])^2 - (3 - f[x])^2, {x, -3, 3}] // N
```

```
Out[243]:= 1266.69
```

Example 3 - Shell Method

```
In[222]:= 2 Pi * Integrate[Abs[-4 - x] (f[x] - g[x]), {x, -3, 3}]
```

```
Out[222]:= 288  $\pi$ 
```

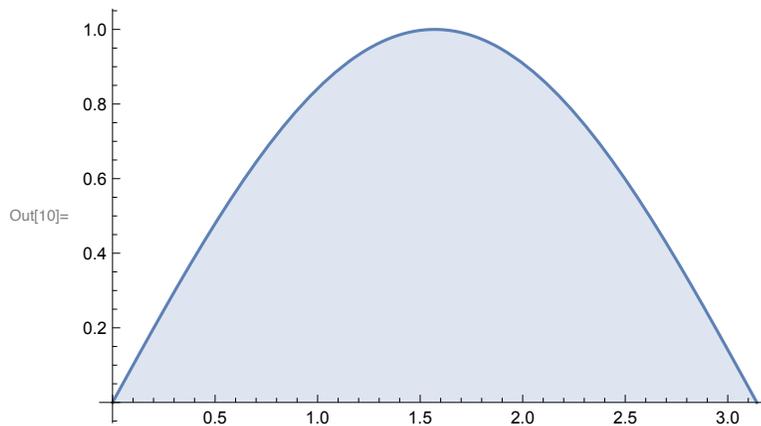
```
In[221]:= 2 Pi * Integrate[Abs[-4 - x] (f[x] - g[x]), {x, -3, 3}] // N
```

```
Out[221]:= 904.779
```

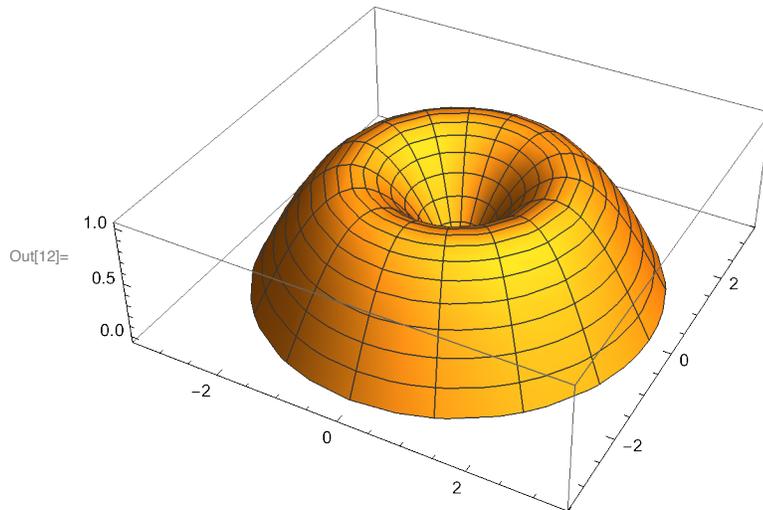
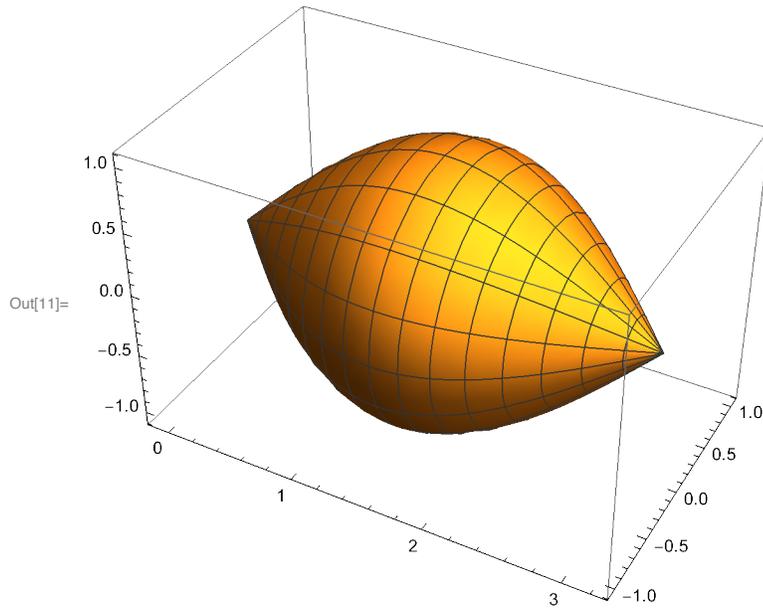
Example 4 - Visualizing Rotations

```
In[8]:= Clear[f]  
f[x_] = Sin[x]  
Plot[f[x], {x, 0, Pi}, Filling -> Axis]
```

```
Out[9]:= Sin[x]
```



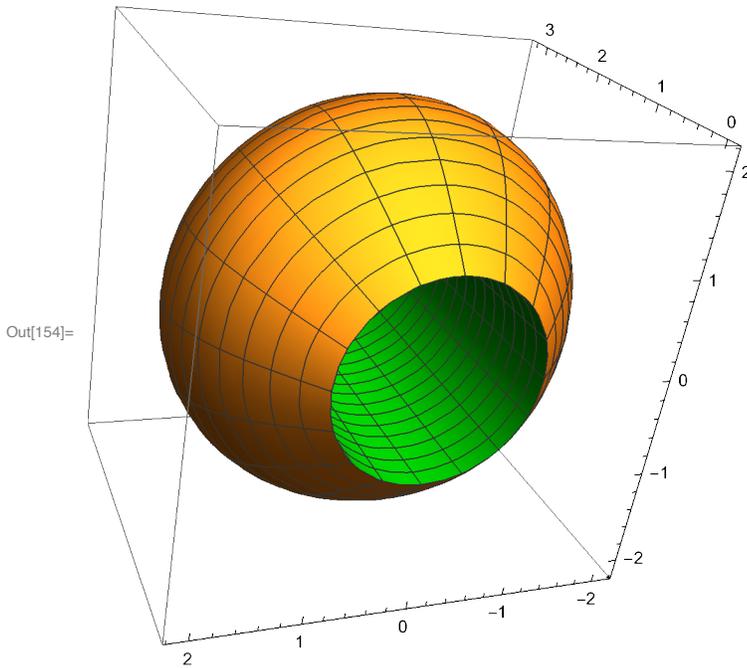
```
In[11]:= RevolutionPlot3D[f[x], {x, 0, Pi}, RevolutionAxis -> "x"]  
Out[11]= RevolutionPlot3D[f[x], {x, 0, Pi}]
```



```

In[152]:= x = RevolutionPlot3D[Sin[t] + 1, {t, 0, Pi}, RevolutionAxis -> {1, 0, 0}];
          y = RevolutionPlot3D[1, {t, 0, Pi}, RevolutionAxis -> {1, 0, 0}, PlotStyle -> Green];
          Show[x, y, ViewPoint -> {-2, 1, 1}]

```



Assignment Questions

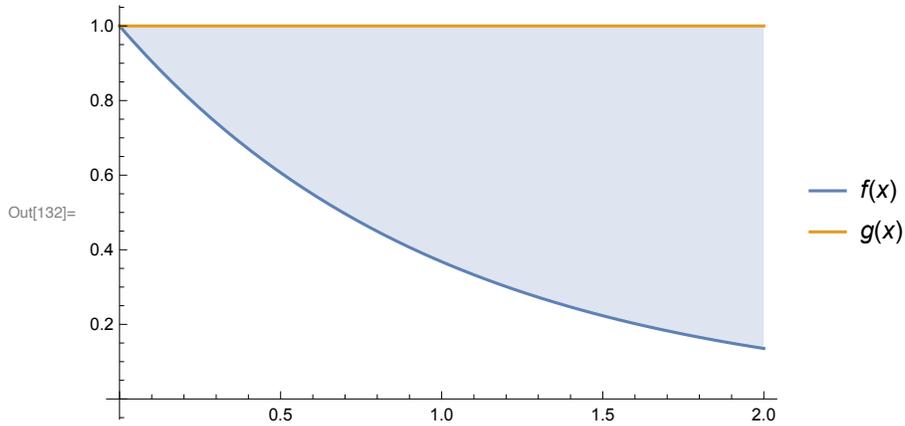
Note : Here's the output for your reference. You may check your answer with mine. But you need to submit the complete codes (input) and output for any credits.

Q1a

Out[129]= e^{-x}

Out[130]= 1

Out[131]= $\{ \{x \rightarrow 0.\} \}$



Q1b

Horizontal line: Washer Method

$$\text{Out[61]=} \left(\frac{9}{2} - \frac{1}{2e^4} + \frac{6}{e^2} \right) \pi$$

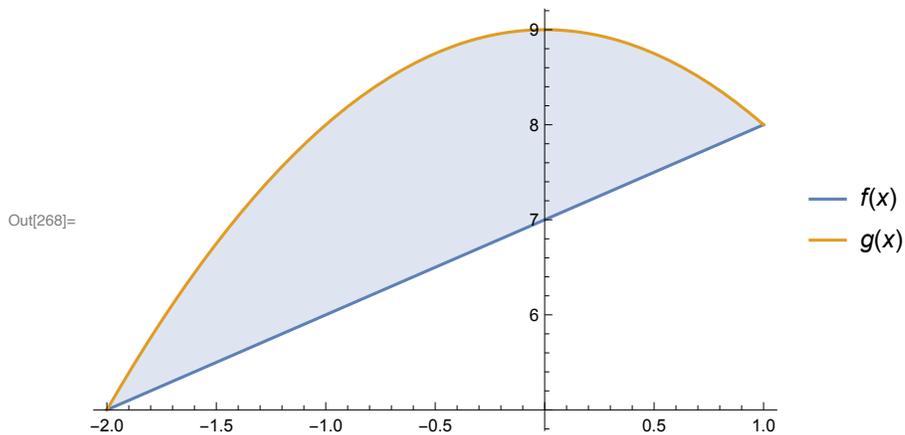
$$\text{Out[62]=} 16.6594$$

Q2a

$$\text{Out[265]=} 7 + x$$

$$\text{Out[266]=} 9 - x^2$$

$$\text{Out[267]=} \{ \{x \rightarrow -2.\}, \{x \rightarrow 1.\} \}$$



Q2b

Vertical line: Shell method

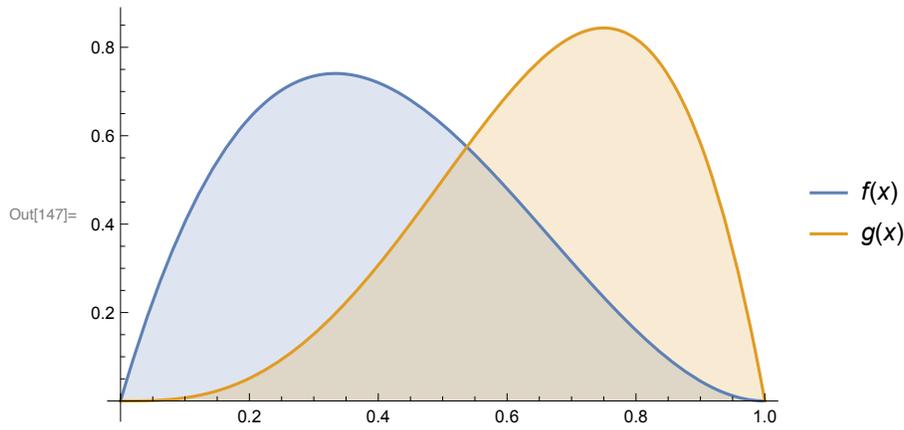
Out[269]= $\frac{45 \pi}{2}$

Out[270]= 70.6858

Q3a

Out[145]= $5(1-x)^2 x$

Out[146]= $8(1-x)x^3$



Out[148]= 0.416667

Out[149]= 0.4

A1 has larger area.

Q3b

Out[150]= 6.28319

Out[151]= 6.70206

V2 has larger volume.

Q3c

(essay questions, no computation)