

ENED 1091 Homework #9

Due Week of April 16th at beginning of Recitation

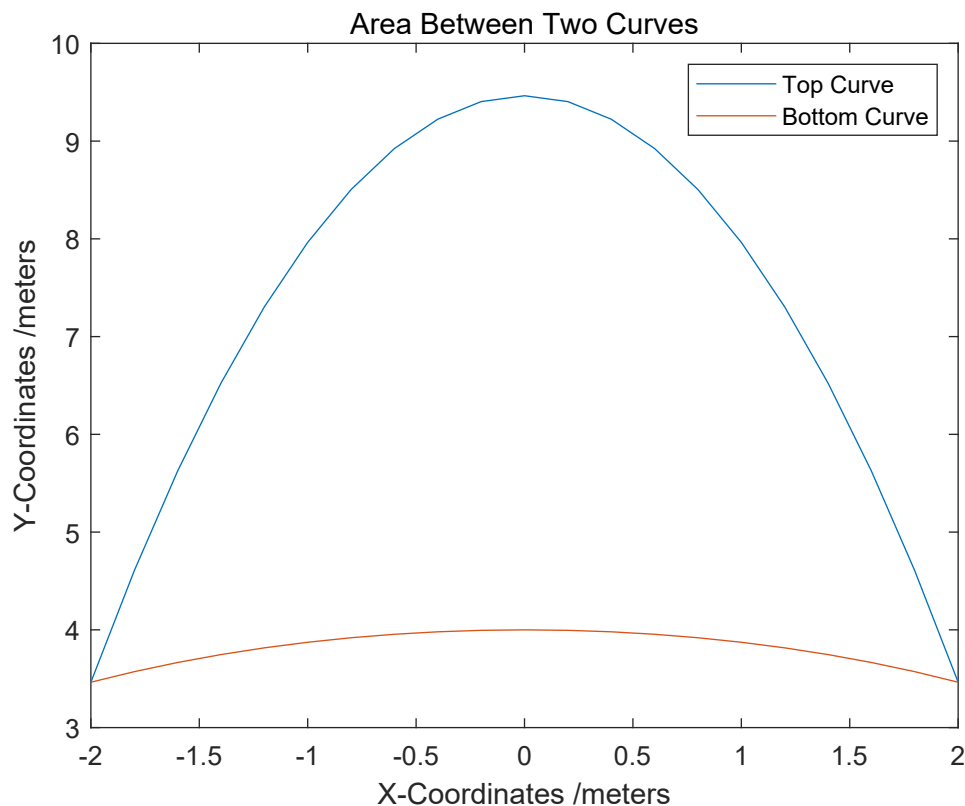
Problem 1: For this problem, you will need the P1.mat file. Save it in your current MATLAB folder. The data file contains 3 vectors:

- A vector of x coordinates, x (units, meters)
- A vector of y coordinates for the top curve, yt (units, meters)
- A vector of y coordinates for the bottom curve, yb (units, meters)

Write a script file that does the following:

- Plots yt and yb on the same graph with x on the x-axis
- Uses the trapezoidal rule to estimate the area between the two curves
- Output the estimate of the area with 3 places behind the decimal point. Include units.

PLOT



ESTIMATED AREA:

Final Area = 14.514 m²

MATLAB SCRIPT:

```
clc;clear;close all;
```

```

load P1.mat
figure(1)
plot(x,yt)
hold on
plot(x,yb)
legend('Top Curve','Bottom Curve')
xlabel('X-Coordinates /meters')
ylabel('Y-Coordinates /meters')
title('Area Between Two Curves')
n=length(x);
Area=zeros(1,n);
Area(1)=0;
for i=1:n-1
    Area(i+1)=Area(i)+(yt(i)-yb(i)+yt(i+1)-
yb(i+1))*(x(i+1)-x(i))*0.5;
end
fprintf('Final Area = %0.3f m^2 \n',Area(end))

```

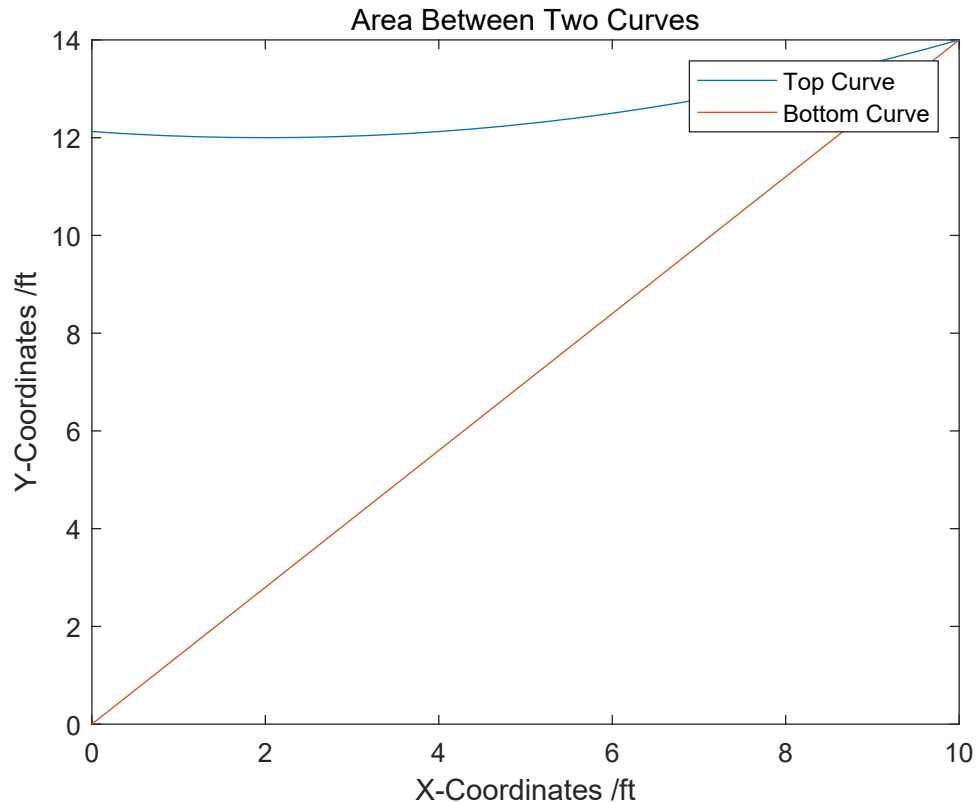
Problem 2: For this problem, you will need the P2.mat file. Save it in your current MATLAB folder. The data file contains 3 vectors:

- A vector of x coordinates, x (units, ft)
- A vector of y coordinates for the top curve, yt (units, ft)
- A vector of y coordinates for the bottom curve, yb (units, ft)

Write a script file that does the following:

- Plots yt and yb on the same graph with x on the x-axis
- Uses the trapezoidal rule to estimate the area between the two curves
- Output the estimate of the area with 3 places behind the decimal point. Include units.

PLOT



ESTIMATED AREA:

Final Area = 55.425 ft²

MATLAB SCRIPT:

```
clc;clear;close all;
load P2.mat
figure(1)
plot(x,yt)
hold on
plot(x,yb)
legend('Top Curve','Bottom Curve')
xlabel('X-Coordinates /ft')
ylabel('Y-Coordinates /ft')
title('Area Between Two Curves')
n=length(x);
Area=zeros(1,n);
Area(1)=0;
for i=1:n-1
    Area(i+1)=Area(i)+(yt(i)-yb(i)+yt(i+1)-yb(i+1))*(x(i+1)-x(i))*0.5;
```

```
end  
fprintf('Final Area = %0.3f ft^2 \n',Area(end))
```

Problem 3: For this problem, you will need the P2.mat file. Write a script file to estimate the Moment Area of Inertia about the y-axis (I_y). Output the estimate for I_y with 3 places behind the decimal point. Include units.

ESTIMATED I_y :

Final $I_y = 855.183 \text{ ft}^4$

MATLAB SCRIPT:

```
clc;clear;close all;  
load P2.mat  
n=length(x);  
Area=zeros(1,n-1);  
for i=1:n-1  
    Area(i)=(yt(i)-yb(i)+yt(i+1)-yb(i+1))*(x(i+1)-  
x(i))*0.5;  
end  
Iy=zeros(1,n);  
for i=1:n-1  
    Iy(i+1)=Iy(i)+((x(i)+x(i+1))*0.5)^2*Area(i);  
end  
fprintf('Final Iy = %0.3f ft^4 \n',Iy(end))
```