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## Roshan Jaiswal-Ferri

%Section - 01  
%Aero 446 HW3: 4/25/25

## Workspace Prep

```
%warning off
format long      %Allows for more accurate decimals
close all;       %Clears all
clear all;       %Clears Workspace
clc;             %Clears Command Window
```

## Problem 1

```
Rearth = 6378; %km
mu = 398600;
p = 6*3600;
beta = 0;
pout = 500;
dod = 0.5;
n = 1;

syms Rorbit
eqn = p == 2*pi*sqrt((Rorbit^3)/mu);
Rorbit = solve(eqn,Rorbit);
Rorbit = double(Rorbit(1));

fe = (1/pi) * asin( sqrt((Rearth/Rorbit)^2 - sin(beta)^2) / cos(beta) );

eclipseTime = 6*3600*fe; %eclipse time in seconds

energy = (pout*eclipseTime)/(dod*n); %in watt seconds
energy = energy/3600; %convert to watt hours

disp(['Eclipse Time (s): ', num2str(eclipseTime)])
disp(['Battery size (w-hr): ', num2str(energy)])
disp(' ')
```

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*Eclipse Time (s): 2683.5515*  
*Battery size (w-hr): 745.431*

## Problem 2

```
Pin = (pout*eclipseTime)/(p-eclipseTime);  
area = (Pin)/245;  
  
disp(['Solar Panel Area 1 (m^2): ', num2str(area)])  
disp(' ')  
  
Solar Panel Area 1 (m^2): 0.28952
```

## Problem 3

```
Pin2 = (600*eclipseTime)/(p-eclipseTime);  
area2 = Pin2/245;  
  
disp(['Solar Panel Area 2 (m^2): ', num2str(area2)])  
disp(['Difference in Area (m^2): ', num2str(area2-area)])  
  
Solar Panel Area 2 (m^2): 0.34742  
Difference in Area (m^2): 0.057903
```

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