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```
%Section - 01
%Aero 446 HW2: 4/18/25
```

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

```
%1) Immediate command!
%2) Multi-Step
%3) Prohibited Commands
%4) Multi-Step
%5) Block Command
```

Problem 2

```
%                    !!!!table at bottom!!!!
```

Problem 3

```
%Assume you're designing two electronic subsystems for a spacecraft at NASA.
% The worst-case predicted temperature ranges are
%• System A: -3°C to +45°C
%• System B: -20°C to +60°C
%What are the Flight Acceptance and Prototype qualification temperature
% limits for these components?

%System A
%Flight Acceptance:
```

```
%   -8 to 50 C
%Prototype:
%   -13 to 55 C

%System A
%Flight Acceptance:
%   -25 to 65 C
%Prototype:
%   -30 to 70 C


% Source: https://explorers.larc.nasa.gov/2019APSMEX/MO/pdf_files/gsfc-
std-7000a_final_3-28-18.pdf
%Pg 152
```

Problem 4

```
T = 327;
r = 6050*1000; %radius in meters
sb = 5.67*10^-8;
E = 1; %black body
A = 4*pi*r^2;

Q = E*sb*A*T^4; %W
disp(['Venus Radiated Heat Flux (Watts): ', num2str(Q)])
```

Venus Radiated Heat Flux (Watts): 2.981911039673822e+17

Problem 5

```
% It is easier to be to cold because it is much easier to generate heat
% than it is to cool off. Also heating up to much can cause more severe
% physical issues (melting etc).
```

Problem 6

```
AU = 1.496e+11; %meters
Tsun = 5800;
rsun = 6.96*10^8; %meters
Asun = 4*pi*rsun^2;

Qsun = sb*Asun*Tsun^4;

Qi = Qsun/(4*pi*AU^2);
disp(['Incident Solar Heat Flux (W/m^2): ', num2str(Qi)])
```

Incident Solar Heat Flux (W/m^2): 1388.834

Problem 7

```
%Scenario 1) Ideal Radiator (Emissivity = 1)
E = 1;
```

```
abs = 1; %absorptivity
A = 1; %m^2
Ar = 2; %radiator area

Pabs = abs*Qi*A;
T = (Pabs/(sb*Ar*E))^(1/4);
disp(['Scenario 1 Temp (K): ', num2str(T)])

%Scenario 2) Emissivity Of 0.5 and Absorptivity of 0.2
E = 0.5;
abs = 0.2; %absorptivity
A = 1; %m^2
Ar = 2; %radiator area

Pabs = abs*Qi*A;
T = (Pabs/(sb*Ar*E))^(1/4);
disp(['Scenario 2 Temp (K): ', num2str(T)])

%Scenario 3) Increase equilibrium to 10C with previous E and A

T = 283.15; %10C
Ar = Pabs/(sb*E*T^4);
disp(['New Total** Radiator Area (m^2): ', num2str(Ar)])
disp(['Individual Radiator Area (m^2): ', num2str(Ar/2)])
```

```
Scenario 1 Temp (K): 332.6667
Scenario 2 Temp (K): 264.5601
New Total** Radiator Area (m^2): 1.5243
Individual Radiator Area (m^2): 0.76213
```

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