Homework 2: Giri Subramanian

The individual answers are given in order in the respective boxes.

Problem 1:

```
data = importdata('USAtmos1976.dat');
atmos_data = data.data;

alt = atmos_data(:,1);
temp = atmos_data(:,5);
pressure = atmos_data(:,6);
density = atmos_data(:,7);

subplot(3,1,1)
plot(temp,alt);
xlabel('Temperature(K)')
ylabel('Altitude(km)')
title('Altitude vs Temperature')

subplot(3,1,2)
plot(pressure,alt);
xlabel('Pressure(N/m^2)')
ylabel('Altitude(km)')
title('Altitude vs Pressure')

subplot(3,1,3)
plot(density,alt);
xlabel('Density(kg/m^3)')
ylabel('Altitude(km)')
title('Altitude vs Density')
```

Problem 2:

```
data = importdata('USAtmos1976.dat');
atmos_data = data.data;

alt = atmos_data(:,1);
sound_speed = atmos_data(:,8);

speed = input('Please enter the speed of the vehicle (in m/s): ');
user_alt = input('Please enter the altitude (in km): ');

% Checking if given altitude is within limits
if user_alt < min(alt) || user_alt > max(alt)
    fprintf('Please enter an altitude value in the range %d:%d kms \n', min(alt),max(alt))
end

% Linearly interpolating to find the value of the speed of sound at the
% given altitude
user_sound_speed = interp1(alt,sound_speed,user_alt);

M = speed/user_sound_speed;

if M < 0.8
    type = 'subsonic';
elseif M > 0.8 && M < 1.2
    type = 'transonic';
elseif M > 1.2 && M < 5
    type = 'supersonic';
else
    type = 'hypersonic';
end

fprintf(' The mach number of the given aircraft is %d and it is %s \n', M , type);
```

Problem 3:

```
clear;clc
T = -20:5:85;
V = 0:5:55;

for i = 1:length(T)+1
    if i == 1
        fprintf('        ');
    else
        fprintf('T = %3d  ',T(i-1));
    end
end
fprintf('\n')

%fprintf('8.3%f',header_row(:))
for i = 1:length(V)
    table(i,:) = 35.7 + 0.6*T - 35.7*V(i)^0.16 + 0.43*(V(i)^0.16)*T;
    fprintf('V = %2d', V(i));
    fprintf('%8.3f',table(i,:))
    fprintf('\n')
end
```

Problem 4:

```
error = input('Please input the allowable error: ');

n = 1;
diff = exp(-1) - (1 - n^(-1))^n;

while diff > error
    n = n+1;
    diff = exp(-1) - (1 - n^(-1))^n;
end

fprintf('The minimum n required is %d and the value of the error is %d \n', n ,diff)

% Values of n required are given below for the respective errors
% 10^-4 = 1840
% 10^-6 = 183941
% 10^-8 = 17752387

% This is not a good way as very soon the time taken to compute it becomes
% very high and it is not efficient
```