```
%Lamin Jammeh
%EE488 Spring 2024
%Problem Set3
%% ************** Q1 ****************************
clear;
clc;
fprintf('_______________Lamin Jammeh EE488 SP2024_____________\n\n');
% Define the known  P, Q, V @ each Bus in p.u
V = [1.0+0*1i 1.0+0*1i 1.0+0*1i];
P = [0 -1.5 -2];  %define P(1) as 0 since the P at slack bus will change
Q = [0 -0.3 -0.28];   %define Q(1) as 0 since the Q at slack bus will change

% define impedance Z @ each line in p.u
Z_base = 1.9;
Z12 = 0.076 + 1i*0.38;   Z13 = 0.057 + 1i*0.285; Z23 = 0.019 + 1i*0.057;
Z12 = Z12/Z_base;  Z13 = Z13/Z_base;  Z23 = Z23/Z_base;

% define admittance Y @ each line in p.u
Y11 = 1/Z12 + 1/Z13; Y22 = 1/Z12 + 1/Z23; Y33 = 1/Z23 + 1/Z13;
Y12 = -1/Z12;  Y21 = Y12;
Y13 = -1/Z13;  Y31 = Y13;
Y23 = -1/Z23;  Y32 = Y23;

% Admittance matrix
Y = [Y11, Y12, Y13;  Y21, Y22, Y23;  Y31, Y32, Y33];
fprintf('_________________Y Admittance Matrix________________\n');
disp(Y);
% Conditions for iteration
tol = 0.0001;  err = 1; old = V; count = 0;
P(2) = P(1,2); Q(2) = Q(1,2);  %this set the fix P and Q values @ bus 2
P(3) = P(1,3); Q(3) = Q(1,3);  %this sets the fix P and Q value @ bus 3
%________________ Iteration loop___________________
%define Table Header
fprintf('Iteration        V1                V2↙
V3\n______________________________________________________________________\n');
while (err>tol)
    count = count+1;
    V(2) = (1/Y(2,2)) * ((P(2)-Q(2)*1i)/conj(V(2)) - Y(2,1)*V(1) - Y(2,3)*V(3));
    V(3) = (1/Y(3,3)) * ((P(3)-Q(3)*1i)/conj(V(3)) - Y(3,1)*V(1) - Y(3,2)*V(2));
    V(1) = V(1)/abs(V(1));  %this retains the mag of voltage source bus
    V_norm = V(1)^2+V(2)^2+V(3)^2;
    err = abs(V_norm-old);
    old = V_norm;
    %display Bus Voltage result for each Iteration
    disp([num2str(count) '               ' num2str(V)]);
end
%define bus you need power from as k
k=1;
for n=1:3
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    P(k) = P(k)+abs(Y(k,n))*abs(V(n))*cos(angle(V(k))-angle(V(n))-angle(Y(k,n)));
    Q(k) = Q(k)+abs(Y(k,n))*abs(V(n))*sin(angle(V(k))-angle(V(n))-angle(Y(k,n)));
end
P(k) = abs(V(k))*P(k); Q(k) = abs(V(k))*Q(k);

fprintf('\n______Real Power, Reactive Power and Voltage at each Bus________\n');
%________________ The display loop__________________
for i = 1:3
    I = num2str(i); v = num2str(V(i),2); p = num2str(P(i),2); q = num2str(Q(i),2);
    disp(['V(',I,') = ',v,';      P',I,') = ',p,';      Q(',I,') = ',q,]);
end
fprintf('\n_____________Dispaly number of Iteration__________\n');
disp(['iterations = ', num2str(count)]);
```