%MATLAB script that perform the Gauss-Seidel iterations for the first

%question of the first exam (first semester 2017/2018)

%%%%%%%% Definition of the Ybus matrix %%%%%%%%%%%%%%%%%%%

Y11 = -15j;

Y12 = 5j;

Y13 = 0;

Y14 = 10j;

Y21 = Y12;

Y22 = -15j;

Y23 = 10j;

Y24 = 0;

Y31 = Y13;

Y32 = Y23;

Y33 = -15j;

Y34 = 5j;

Y41 = Y14;

Y42 = Y24;

Y43 = Y34;

Y44 = -15j;

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%%%%%%%% Initial conditions of voltages %%%%%%%%%%%%%%%%%

V1 = 1; % Slack bus

V2 = 1; % PQ bus

V3 = 1;

V4 = 1;

P2 = -.5; Q2 = -.2;

P3 = -.4; Q3 = -.1;

P4 = -.2; Q4 = 0;

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%%%%%%%% Calculation of Gauss-Seidel interations %%%%%%%%%%%%%

for i=1:19

V2(i+1) = ((P2-j\*Q2)/conj(V2(i)) - Y21\*V1 - Y23\*V3(i) - Y24\*V4(i))/Y22;

V3(i+1) = ((P3-j\*Q3)/conj(V3(i)) - Y31\*V1 - Y32\*V2(i+1) - Y34\*V4(i))/Y33;

V4(i+1) = ((P4-j\*Q4)/conj(V4(i)) - Y41\*V1 - Y42\*V2(i+1) - Y43\*V3(i+1))/Y44;

end

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PFE1 = conj(V1)\*(Y11\*V1+Y12\*V2(i+1)+Y13\*V3(i+1)+Y14\*V4(i+1));

P1 = real(PFE1);

Q1 = -imag(PFE1);

figure, subplot(611), plot(abs(V2)), ylabel('|V\_2(k)|'),

subplot(612), plot(angle(V2)\*180/pi),

ylabel('\angleV\_2(k)^\circ')

subplot(613), plot(abs(V3)), ylabel('|V\_3(k)|'),

subplot(614), plot(angle(V3)\*180/pi),

ylabel('\angleV\_3(k)^\circ'),

subplot(615), plot(abs(V4)), ylabel('|V\_4(k)|'),

subplot(616), plot(angle(V4)\*180/pi),

ylabel('\angleV\_4(k)^\circ'),xlabel('iteration number k')

fprintf('Iteration |V2| Angle of V2 \n')

bus\_info=[[0:19]' abs(V2)' angle(V2)'\*180/pi];

disp(bus\_info)

fprintf('Iteration |V3| Angle of V3 \n')

bus\_info=[[0:19]' abs(V3)' angle(V3)'\*180/pi];

disp(bus\_info)

fprintf('Iteration |V4| Angle of V4 \n')

bus\_info=[[0:19]' abs(V4)' angle(V4)'\*180/pi];

disp(bus\_info)

fprintf(' Bus number P Q \n')

bus\_info=[1 P1 Q1];

disp(bus\_info)