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%%Advance_Energy_Storage system
%%Comparative_Battery_Analysis
%%Question 1
%%Plot the OCV-SOC data

%For C1202

C1202SOC=[0 0.0158 0.0315 0.0473 0.0630 0.0788 0.0945 0.1062 0.1179 0.1296 0.1413
0.1530 0.1885 0.2239 0.2594 0.2949 0.3303 0.3840 0.4376 0.4912 0.5448 0.5985 0.6547
0.7110 0.7673 0.8235 0.8798 0.9039 0.9279 0.9519 0.9760 1.0000];
C1202OCV=[2.6929 3.0649 3.2384 3.3177 3.3552 3.3762 3.3923 3.4039 3.4162 3.4290
3.4425 3.4561 3.4967 3.5324 3.5619 3.5868 3.6094 3.6440 3.6836 3.7298 3.7817 3.8368
3.8946 3.9490 3.9974 4.0392 4.0759 4.0912 4.1073 4.1250 4.1457 4.1710];

figure(1)

plot(C1202SOC, C1202OCV, 'Linewidth',3);
title('C1202'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

%For C1203
figure(2)
C1203SOC=[0 0.0159 0.0317 0.0476 0.0634 0.0793 0.0951 0.1069 0.1186 0.1304 0.1421
0.1539 0.1895 0.2250 0.2606 0.2962 0.3318 0.3855 0.4392 0.4929 0.5466 0.6003 0.6569
0.7135 0.7701 0.8267 0.8833 0.9067 0.9300 0.9533 0.9767 1.0000];
C1203OCV=[2.6902 3.0640 3.2381 3.3175 3.3551 3.3761 3.3923 3.4040 3.4162 3.4291
3.4425 3.4562 3.4968 3.5325 3.5622 3.5874 3.6103 3.6453 3.6852 3.7315 3.7834 3.8384
3.8963 3.9508 3.9995 4.0415 4.0784 4.0933 4.1089 4.1259 4.1456 4.1693];
plot(C1203SOC, C1203OCV, 'Linewidth',3);
title('C1203'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

%For C1204

C1204SOC=[0 0.0157 0.0315 0.0472 0.0629 0.0786 0.0944 0.1063 0.1182 0.1301 0.1420
0.1539 0.1896 0.2254 0.2611 0.2968 0.3325 0.3864 0.4403 0.4943 0.5482 0.6021 0.6582
0.7144 0.7706 0.8267 0.8829 0.9063 0.9297 0.9532 0.9766 1.000];
C1204OCV=[2.7003 3.0671 3.2395 3.3171 3.3543 3.3751 3.3910 3.4028 3.4151 3.4282
3.4418 3.4557 3.4965 3.5323 3.5621 3.5873 3.6101 3.6451 3.6849 3.7313 3.7833 3.8384
3.8957 3.9498 3.9982 4.0401 4.0773 4.0925 4.1083 4.1256 4.1456 4.1696];
figure(3)
plot(C1204SOC, C1204OCV, 'Linewidth',3);
title('C1204'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

%For C1205
C1205SOC=[0 0.0164 0.0328 0.0492 0.0656 0.0820 0.0984 0.1092 0.1200 0.1308 0.1416
0.1523 0.1880 0.2237 0.2594 0.2951 0.3308 0.3867 0.4426 0.4985 0.5644 0.6103 0.6709
0.7315 0.7920 0.8526 0.9132 0.9306 0.9479 0.9653 0.9826 1.0000];
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C1205OCV=[2.7296 3.0857 3.2497 3.3247 3.3609 3.3821 3.3991 3.4100 3.4212 3.4329
3.4448 3.4570 3.4963 3.5314 3.5611 3.5865 3.6099 3.6471 3.6893 3.7382 3.7931 3.8511
3.9139 3.9827 4.0250 4.0694 4.1080 4.1187 4.1297 4.1412 4.1537 4.1676];
figure(4)
plot(C1205SOC, C1205OCV, 'Linewidth',3);
title('C1205'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

%All in a single figure
figure(5)
subplot(2,2,1)
plot(C1202SOC, C1202OCV, 'Linewidth',3);
title('C1202'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

subplot(2,2,2)
plot(C1203SOC, C1203OCV, 'Linewidth',3);
title('C1203'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

subplot(2,2,3)
plot(C1204SOC, C1204OCV, 'Linewidth',3);
title('C1204'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

subplot(2,2,4)
plot(C1205SOC, C1205OCV, 'Linewidth',3);
title('C1205'); %give title to plot
xlabel('SOC'); %give x-axis label
ylabel('OCV'); %give y axis label

%% Question 2
% Linear Model
% For C1202
one = [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]';
P_Linear_C1202 =  [one,C1202SOC'];
V0_Linear_C1202 = (C1202OCV)';
K_Linear_C1202 = lsqr(P_Linear_C1202,V0_Linear_C1202);
Vmodel_Linear_C1202 = P_Linear_C1202*K_Linear_C1202;

figure(6)
plot(C1202SOC,Vmodel_Linear_C1202,'LineWidth',3)
title('Linear Model for C1202'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%For C1203
one = [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]';
P_Linear_C1203 =  [one,C1203SOC'];
V0_Linear_C1203 = (C1203OCV)';
K_Linear_C1203 = lsqr(P_Linear_C1203,V0_Linear_C1203);
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Vmodel_Linear_C1203 = P_Linear_C1203*K_Linear_C1203;

figure(7)
plot(C1203SOC,Vmodel_Linear_C1203,'LineWidth',3)
title('Linear Model for C1203'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%For C1204
one = [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]';
P_Linear_C1204 =  [one,C1204SOC'];
V0_Linear_C1204 = (C1204OCV)';
K_Linear_C1204 = lsqr(P_Linear_C1204,V0_Linear_C1204);
Vmodel_Linear_C1204 = P_Linear_C1204*K_Linear_C1204;

figure(8)
plot(C1204SOC,Vmodel_Linear_C1204,'LineWidth',3)
title('Linear Model for C1204'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%For C1205
one = [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1]';
P_Linear_C1205 =  [one,C1205SOC'];
V0_Linear_C1205 = (C1205OCV)';
K_Linear_C1205 = lsqr(P_Linear_C1205,V0_Linear_C1205);
Vmodel_Linear_C1205 = P_Linear_C1205*K_Linear_C1205;

figure(9)
plot(C1205SOC,Vmodel_Linear_C1205,'LineWidth',3)
title('Linear Model for C1205'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%Shepard Model

%% For C1202

E = .175;
s_C1202 = (1-2*E)*(C1202SOC)+E;

V0_Shepard_C1202 = C1202OCV';
P_Shepard_C1202 = [one,((1./s_C1202)')];
K_Shepard_C1202 = lsqr(P_Shepard_C1202,V0_Shepard_C1202);
Vmodel_Shepard_C1202 =P_Shepard_C1202*K_Shepard_C1202;
figure(10)
plot(s_C1202,Vmodel_Shepard_C1202,'LineWidth',3)
title('Shepard Model for C1202'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label


%% For C1203

E = .175;
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s_C1203 = (1-2*E)*(C1203SOC)+E;

V0_Shepard_C1203 = C1203OCV';
P_Shepard_C1203 = [one,((1./s_C1203)')];
K_Shepard_C1203 = lsqr(P_Shepard_C1203,V0_Shepard_C1203);
Vmodel_Shepard_C1203 =P_Shepard_C1203*K_Shepard_C1203;
figure(11)
plot(s_C1203,Vmodel_Shepard_C1203,'LineWidth',3)
title('Shepard Model for C1203'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label


%% For C1204

E = .175;
s_C1204 = (1-2*E)*(C1204SOC)+E;

V0_Shepard_C1204 = [C1204OCV'];
P_Shepard_C1204 = [one,([1./s_C1204]')];
K_Shepard_C1204 = lsqr(P_Shepard_C1204,V0_Shepard_C1204);
Vmodel_Shepard_C1204 =P_Shepard_C1204*K_Shepard_C1204;
figure(12)
plot(s_C1204,Vmodel_Shepard_C1204,'LineWidth',3)
title('Shepard Model for C1204'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label


%% For C1205

E = .175;
s_C1205 = (1-2*E)*(C1205SOC)+E;

V0_Shepard_C1205 = C1205OCV';
P_Shepard_C1205 = [one,((1./s_C1205)')];
K_Shepard_C1205 = lsqr(P_Shepard_C1205,V0_Shepard_C1205);
Vmodel_Shepard_C1205 =P_Shepard_C1205*K_Shepard_C1205;
figure(13)
plot(s_C1205,Vmodel_Shepard_C1205,'LineWidth',3)
title('Shepard Model for C1205'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%Nernst Model
%%For C1202

P_Nernst_C1202 = [one,(log(s_C1202))',(log(1-s_C1202)')];
V0_Nernst_C1202 = C1202OCV';
K_Nernst_C1202 = lsqr(P_Nernst_C1202,V0_Nernst_C1202);
Vmodel_Nernst_C1202 =P_Nernst_C1202*K_Nernst_C1202;

figure(14)
plot(s_C1202,Vmodel_Nernst_C1202,'LineWidth',3)
title('Nernst Model for C1202'); %give title to plot
```

```
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%For C1203

P_Nernst_C1203 = [one,(log(s_C1203))',(log(1-s_C1203)')];
V0_Nernst_C1203 = C1203OCV';
K_Nernst_C1203 = lsqr(P_Nernst_C1203,V0_Nernst_C1203);
Vmodel_Nernst_C1203 =P_Nernst_C1203*K_Nernst_C1203;

figure(15)
plot(s_C1203,Vmodel_Nernst_C1203,'LineWidth',3)
title('Nernst Model for C1203'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%For C1204

P_Nernst_C1204 = [one,(log(s_C1204))',log(1-s_C1204)'];
V0_Nernst_C1204 = C1204OCV';
K_Nernst_C1204 = lsqr(P_Nernst_C1204,V0_Nernst_C1204);
Vmodel_Nernst_C1204 =P_Nernst_C1204*K_Nernst_C1204;

figure(16)
plot(s_C1204,Vmodel_Nernst_C1204,'LineWidth',3)
title('Nernst Model for C1204'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%For C1205

P_Nernst_C1205 = [one,(log(s_C1205))',log(1-s_C1205)'];
V0_Nernst_C1205 = C1205OCV';
K_Nernst_C1205 = lsqr(P_Nernst_C1205,V0_Nernst_C1205);
Vmodel_Nernst_C1205 =P_Nernst_C1205*K_Nernst_C1205;

figure(17)
plot(s_C1205,Vmodel_Nernst_C1205,'LineWidth',3)
title('Nernst Model for C1205'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label


%%Combined Model

%%For C1202

P_Combined_C1202 = [one,(1./s_C1202)',(s_C1202)',(log(s_C1202))',log(1-s_C1202)'];
V0_Combined_C1202 = [C1202OCV'];
K_Combined_C1202 = lsqr(P_Combined_C1202,V0_Combined_C1202);
Vmodel_Combined_C1202 =P_Combined_C1202*K_Combined_C1202;

figure(18)
plot(s_C1202,Vmodel_Combined_C1202,'LineWidth',3)
title('Combined Model for C1202'); %give title to plot
```

```
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label


%%For C1203

P_Combined_C1203 = [one,(1./s_C1203)',(s_C1203)',(log(s_C1203))',log(1-s_C1203)'];
V0_Combined_C1203 = C1203OCV';
K_Combined_C1203 = lsqr(P_Combined_C1203,V0_Combined_C1203);
Vmodel_Combined_C1203 =P_Combined_C1203*K_Combined_C1203;

figure(19)
plot(s_C1203,Vmodel_Combined_C1203,'LineWidth',3)
title('Combined Model for C1203'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%For C1204

P_Combined_C1204 = [one,(1./s_C1204)',(s_C1204)',(log(s_C1204))',log(1-s_C1204)'];
V0_Combined_C1204 = [C1204OCV'];
K_Combined_C1204 = lsqr(P_Combined_C1204,V0_Combined_C1204);
Vmodel_Combined_C1204 =P_Combined_C1204*K_Combined_C1204;

figure(20)
plot(s_C1204,Vmodel_Combined_C1204,'LineWidth',3)
title('Combined Model for C1204'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label


%%For C1205

P_Combined_C1205 = [one,(1./s_C1205)',(s_C1205)',(log(s_C1205))',1-log(1-s_C1205)'];
V0_Combined_C1205 = [C1205OCV'];
K_Combined_C1205 = lsqr(P_Combined_C1205,V0_Combined_C1205);
Vmodel_Combined_C1205 =P_Combined_C1205*K_Combined_C1205;

figure(21)
plot(s_C1205,Vmodel_Combined_C1205,'LineWidth',3)
title('Combined Model for C1205'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%Combined+3 Model

%%For C1202

P_Combined3_C1202 =
[one,(1./s_C1202)',(s_C1202)',(1./((s_C1202.^2))'),(1./((s_C1202).^3)'),(1./((s_C1202
).^4)'),(log(s_C1202))',log(1-s_C1202)'];
V0_Combined3_C1202 = [C1202OCV'];
K_Combined3_C1202 = lsqr(P_Combined3_C1202,V0_Combined3_C1202);
Vmodel_Combined3_C1202 =P_Combined_C1202*K_Combined_C1202;
```

```
figure(22)
plot(s_C1202,Vmodel_Combined3_C1202,'LineWidth',3)
title('Combined+3 Model for C1202'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%For C1203

P_Combined3_C1203 =
[one,(1./s_C1203)',(s_C1203)',(1./((s_C1203.^2))'),(1./((s_C1203).^3)'),(1./((s_C1203
).^4)'),(log(s_C1203))',log(1-s_C1203)'];
V0_Combined3_C1203 = [C1203OCV'];
K_Combined3_C1203 = lsqr(P_Combined3_C1203,V0_Combined3_C1203);
Vmodel_Combined3_C1203 =P_Combined_C1203*K_Combined_C1203;

figure(23)
plot(s_C1203,Vmodel_Combined3_C1203,'LineWidth',3)
title('Combined+3 Model for C1203'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%For C1204

P_Combined3_C1204 =
[one,(1./s_C1204)',(s_C1204)',(1./((s_C1204.^2))'),(1./((s_C1204).^3)'),(1./((s_C1204
).^4)'),(log(s_C1204))',(log(1-s_C1204))'];
V0_Combined3_C1204 = [C1204OCV'];
K_Combined3_C1204 = lsqr(P_Combined3_C1204,V0_Combined3_C1204);
Vmodel_Combined3_C1204 =P_Combined_C1204*K_Combined_C1204;

figure(24)
plot(s_C1204,Vmodel_Combined3_C1204,'LineWidth',3)
title('Combined+3 Model for C1204'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%For C1205

P_Combined3_C1205 =
[one,(1./s_C1205)',(s_C1205)',(1./((s_C1205.^2))'),(1./((s_C1205).^3)'),(1./((s_C1205
).^4)'),(log(s_C1205))',log(1-s_C1205)'];
V0_Combined3_C1205 = [C1205OCV'];
K_Combined3_C1205 = lsqr(P_Combined3_C1205,V0_Combined3_C1205);
Vmodel_Combined3_C1205 =P_Combined_C1205*K_Combined_C1205;

figure(25)
plot(s_C1205,Vmodel_Combined3_C1205,'LineWidth',3)
title('Combined+3 Model for C1205'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%Polynomial Model (m =3 and n =2)
%%for C1202
```

```
P_Polynomial_C1202 =
[one,((s_C1202)'),(((s_C1202.^2))'),(((s_C1202).^3)'),(((s_C1202).^-
1)'),(((s_C1202).^-2)')];

V0_Polynomial_C1202 = C1202OCV';
K_Polynomial_C1202 = lsqr(P_Polynomial_C1202,V0_Polynomial_C1202);
Vmodel_Polynomial_C1202 =P_Polynomial_C1202*K_Polynomial_C1202;

figure(23)
plot(s_C1202,Vmodel_Polynomial_C1202,'LineWidth',3)
title('Polynomial Model for C1202'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%for C1203
P_Polynomial_C1203 =
[one,((s_C1203)'),(((s_C1203.^2))'),(((s_C1203).^3)'),(((s_C1203).^-
1)'),(((s_C1203).^-2)')];

V0_Polynomial_C1203 = C1203OCV';
K_Polynomial_C1203 = lsqr(P_Polynomial_C1203,V0_Polynomial_C1203);
Vmodel_Polynomial_C1203 =P_Polynomial_C1203*K_Polynomial_C1203;

figure(24)
plot(s_C1203,Vmodel_Polynomial_C1203,'LineWidth',3)
title('Polynomial Model for C1203'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%for C1204
P_Polynomial_C1204 =
[one,((s_C1204)'),(((s_C1204.^2))'),(((s_C1204).^3)'),(((s_C1204).^-
1)'),(((s_C1204).^-2)')];

V0_Polynomial_C1204 = C1204OCV';
K_Polynomial_C1204 = lsqr(P_Polynomial_C1204,V0_Polynomial_C1204);
Vmodel_Polynomial_C1204 =P_Polynomial_C1204*K_Polynomial_C1204;

figure(25)
plot(s_C1204,Vmodel_Polynomial_C1204,'LineWidth',3)
title('Polynomial Model for C1204'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%for C1205
P_Polynomial_C1205 =
[one,((s_C1205)'),(((s_C1205.^2))'),(((s_C1205).^3)'),(((s_C1205).^-
1)'),(((s_C1205).^-2)')];

V0_Polynomial_C1205 = C1205OCV';
K_Polynomial_C1205 = lsqr(P_Polynomial_C1205,V0_Polynomial_C1205);
Vmodel_Polynomial_C1205=P_Polynomial_C1205*K_Polynomial_C1205;

figure(26)
plot(s_C1205,Vmodel_Polynomial_C1205,'LineWidth',3)
```

```
title('Polynomial Model for C1205'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%%Exponential Model m=2 and n=1
%% For C1202

P_Exponential_C1202 = [one,exp(C1202SOC)',exp((C1202SOC).^2)',exp(-(C1202SOC).^-1)'];
V0_Exponential_C1202 = C1202OCV';
K_Exponential_C1202 = lsqr(P_Exponential_C1202,V0_Exponential_C1202);
Vmodel_Exponential_C1202 =P_Exponential_C1202*K_Exponential_C1202;

figure(27)
plot(C1202SOC,Vmodel_Exponential_C1202,'LineWidth',3)
title('Exponential Model for C1202'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%% For C1203

P_Exponential_C1203 = [one,exp(C1203SOC)',exp((C1203SOC).^2)',exp(-(C1203SOC).^-1)'];
V0_Exponential_C1203 = C1203OCV';
K_Exponential_C1203 = lsqr(P_Exponential_C1203,V0_Exponential_C1203);
Vmodel_Exponential_C1203 =P_Exponential_C1203*K_Exponential_C1203;

figure(28)
plot(C1203SOC,Vmodel_Exponential_C1203,'LineWidth',3)
title('Exponential Model for C1203'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%% For C1204

P_Exponential_C1204 = [one,exp(C1204SOC)',exp((C1204SOC).^2)',exp(-(C1204SOC).^-1)'];
V0_Exponential_C1204 = C1204OCV';
K_Exponential_C1204 = lsqr(P_Exponential_C1204,V0_Exponential_C1204);
Vmodel_Exponential_C1204 =P_Exponential_C1204*K_Exponential_C1204;

figure(29)
plot(C1204SOC,Vmodel_Exponential_C1204,'LineWidth',3)
title('Exponential Model for C1204'); %give title to plot
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label

%% For C1205

P_Exponential_C1205 = [one,exp(C1205SOC)',exp((C1205SOC).^2)',exp(-(C1205SOC).^-1)'];
V0_Exponential_C1205 = C1205OCV';
K_Exponential_C1205 = lsqr(P_Exponential_C1205,V0_Exponential_C1205);
Vmodel_Exponential_C1205 =P_Exponential_C1205*K_Exponential_C1205;

figure(30)
plot(C1205SOC,Vmodel_Exponential_C1205,'LineWidth',3)
title('Exponential Model for C1205'); %give title to plot
xlabel('s'); %give x-axis label
```

```
ylabel('Vo'); %give y axis label


%% Question 3
%%For Linear Model
%% C1202
V_Error_Linear_C1202 = [C1202OCV'-Vmodel_Linear_C1202];
figure(31)
plot(C1202SOC,C1202OCV,C1202SOC,Vmodel_Linear_C1202,C1202SOC,V_Error_Linear_C1202,'Li
neWidth',3)
title('Error for Linear Model Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Linear','Error')

%% C1203
V_Error_Linear_C1203 = [C1203OCV'-Vmodel_Linear_C1203];
figure(32)
plot(C1203SOC,C1203OCV,C1203SOC,Vmodel_Linear_C1203,C1203SOC,V_Error_Linear_C1203,'Li
neWidth',3)
title('Error for Linear Model Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Linear','Error')

%% C1204
V_Error_Linear_C1204 = [C1204OCV'-Vmodel_Linear_C1204];
figure(33)
plot(C1204SOC,C1204OCV,C1204SOC,Vmodel_Linear_C1204,C1204SOC,V_Error_Linear_C1204,'Li
neWidth',3)
title('Error for Linear Model Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Linear','Error')

%% C1205
V_Error_Linear_C1205 = [C1205OCV'-Vmodel_Linear_C1205];
figure(34)
plot(C1205SOC,C1205OCV,C1205SOC,Vmodel_Linear_C1205,C1205SOC,V_Error_Linear_C1205,'Li
neWidth',3)
title('Error for Linear Model Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Linear','Error')

%%For Shepard Model
%%C1202

V_Error_Shepard_C1202 = [C1202OCV'-Vmodel_Shepard_C1202];
figure(35)
plot(C1202SOC,C1202OCV,C1202SOC,Vmodel_Shepard_C1202,C1202SOC,V_Error_Shepard_C1202,'
LineWidth',3)
title('Error for Shepard model Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
```

```
legend('V Data','Vmodel Shepard','Error')

%% C1203
V_Error_Shepard_C1203 = [C1203OCV'-Vmodel_Shepard_C1203];
figure(36)
plot(C1203SOC,C1203OCV,C1203SOC,Vmodel_Shepard_C1203,C1203SOC,V_Error_Shepard_C1203,'
LineWidth',3)
title('Error for Shepard Model Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Shepard','Error')

%% C1204
V_Error_Shepard_C1204 = [C1204OCV'-Vmodel_Shepard_C1204];
figure(37)
plot(C1204SOC,C1204OCV,C1204SOC,Vmodel_Shepard_C1204,C1204SOC,V_Error_Shepard_C1204,'
LineWidth',3)
title('Error for Shepard Model Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Shepard','Error')

%% C1205
V_Error_Shepard_C1205 = [C1205OCV'-Vmodel_Shepard_C1205];
figure(38)
plot(C1205SOC,C1205OCV,C1205SOC,Vmodel_Shepard_C1205,C1205SOC,V_Error_Shepard_C1205,'
LineWidth',3)
title('Error for Shepard Model Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Shepard','Error')

%%For Nernst Model
%% C1202

V_Error_Nernst_C1202 = [C1202OCV'-Vmodel_Nernst_C1202];
figure(39)
plot(C1202SOC,C1202OCV,C1202SOC,Vmodel_Nernst_C1202,C1202SOC,V_Error_Nernst_C1202,'Li
neWidth',3)
title('Error for Nernst model Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Nernst','Error')

%% C1203
V_Error_Nernst_C1203 = [C1203OCV'-Vmodel_Nernst_C1203];
figure(40)
plot(C1203SOC,C1203OCV,C1203SOC,Vmodel_Nernst_C1203,C1203SOC,V_Error_Nernst_C1203,'Li
neWidth',3)
title('Error for Nernst Model Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Nernst','Error')

%% C1204
```

```
V_Error_Nernst_C1204 = [C1204OCV'-Vmodel_Nernst_C1204];
figure(41)
plot(C1204SOC,C1204OCV,C1204SOC,Vmodel_Nernst_C1204,C1204SOC,V_Error_Nernst_C1204,'Li
neWidth',3)
title('Error for Nernst Model Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Nernst','Error')

%% C1205
V_Error_Nernst_C1205 = [C1205OCV'-Vmodel_Nernst_C1205];
figure(42)
plot(C1205SOC,C1205OCV,C1205SOC,Vmodel_Nernst_C1205,C1205SOC,V_Error_Nernst_C1205,'Li
neWidth',3)
title('Error for Nernst Model Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Nernst','Error')



%%For Combined Model
%% C1202

V_Error_Combined_C1202 = [C1202OCV'-Vmodel_Combined_C1202];
figure(43)
plot(C1202SOC,C1202OCV,C1202SOC,Vmodel_Combined_C1202,C1202SOC,V_Error_Combined_C1202
,'LineWidth',3)
title('Error for Combined model Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined','Error')

%% C1203
V_Error_Combined_C1203 = [C1203OCV'-Vmodel_Combined_C1203];
figure(44)
plot(C1203SOC,C1203OCV,C1203SOC,Vmodel_Combined_C1203,C1203SOC,V_Error_Combined_C1203
,'LineWidth',3)
title('Error for Combined Model Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined','Error')

%% C1204
V_Error_Combined_C1204 = [C1204OCV'-Vmodel_Combined_C1204];
figure(45)
plot(C1204SOC,C1204OCV,C1204SOC,Vmodel_Combined_C1204,C1204SOC,V_Error_Combined_C1204
,'LineWidth',3)
title('Error for Combined Model Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined','Error')

%% C1205
V_Error_Combined_C1205 = [C1205OCV'-(Vmodel_Combined_C1205)];
```

```
figure(46)
plot(C1205SOC,C1205OCV,C1205SOC,Vmodel_Combined_C1205,C1205SOC,V_Error_Combined_C1205
,'LineWidth',3)
title('Error for Combined Model Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined','Error')

%%For Combined+3 Model
%% C1202

V_Error_Combined3_C1202 = [C1202OCV'-Vmodel_Combined3_C1202];
figure(47)
plot(C1202SOC,C1202OCV,C1202SOC,Vmodel_Combined3_C1202,C1202SOC,V_Error_Combined3_C12
02,'LineWidth',3)
title('Error for Combined+3 model Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined+3','Error')

%% C1203
V_Error_Combined3_C1203 = [C1203OCV'-Vmodel_Combined3_C1203];
figure(48)
plot(C1203SOC,C1203OCV,C1203SOC,Vmodel_Combined3_C1203,C1203SOC,V_Error_Combined3_C12
03,'LineWidth',3)
title('Error for Combined+3 Model Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined+3','Error')

%% C1204
V_Error_Combined3_C1204 = [C1204OCV'-Vmodel_Combined3_C1204];
figure(49)
plot(C1204SOC,C1204OCV,C1204SOC,Vmodel_Combined3_C1204,C1204SOC,V_Error_Combined3_C12
04,'LineWidth',3)
title('Error for Combined+3 Model Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined+3','Error')

%% C1205
V_Error_Combined3_C1205 = [C1205OCV'-(Vmodel_Combined3_C1205)];
figure(50)
plot(C1205SOC,C1205OCV,C1205SOC,Vmodel_Combined3_C1205,C1205SOC,V_Error_Combined3_C12
05,'LineWidth',3)
title('Error for Combined+3 Model Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Combined+3','Error')


%%For Polynomial Model
%% C1202

V_Error_Polynomial_C1202 = [C1202OCV'-Vmodel_Polynomial_C1202];
```

```
figure(51)
plot(C1202SOC,C1202OCV,C1202SOC,Vmodel_Polynomial_C1202,C1202SOC,V_Error_Polynomial_C
1202,'LineWidth',3)
title('Error for Polynomial model Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Polynomial','Error')

%% C1203
V_Error_Polynomial_C1203 = [C1203OCV'-Vmodel_Polynomial_C1203];
figure(52)
plot(C1203SOC,C1203OCV,C1203SOC,Vmodel_Polynomial_C1203,C1203SOC,V_Error_Polynomial_C
1203,'LineWidth',3)
title('Error for Polynomial Model Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Polynomial','Error')

%% C1204
V_Error_Polynomial_C1204 = [C1204OCV'-Vmodel_Polynomial_C1204];
figure(53)
plot(C1204SOC,C1204OCV,C1204SOC,Vmodel_Polynomial_C1204,C1204SOC,V_Error_Polynomial_C
1204,'LineWidth',3)
title('Error for Polynomial Model Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Polynomial','Error')

%% C1205
V_Error_Polynomial_C1205 = [C1205OCV'-(Vmodel_Polynomial_C1205)];
figure(54)
plot(C1205SOC,C1205OCV,C1205SOC,Vmodel_Polynomial_C1205,C1205SOC,V_Error_Polynomial_C
1205,'LineWidth',3)
title('Error for Polynomial Model Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Polynomial','Error')

%%For Exponential Model
%% C1202

V_Error_Exponential_C1202 = [C1202OCV'-Vmodel_Exponential_C1202];
figure(55)
plot(C1202SOC,C1202OCV,C1202SOC,Vmodel_Exponential_C1202,C1202SOC,V_Error_Exponential
_C1202,'LineWidth',3)
title('Error for Exponential model Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Exponential','Error')

%% C1203
V_Error_Exponential_C1203 = [C1203OCV'-Vmodel_Exponential_C1203];
figure(56)
plot(C1203SOC,C1203OCV,C1203SOC,Vmodel_Exponential_C1203,C1203SOC,V_Error_Exponential
_C1203,'LineWidth',3)
```

```
title('Error for Exponential Model Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Exponential','Error')

%% C1204
V_Error_Exponential_C1204 = [C1204OCV'-Vmodel_Exponential_C1204];
figure(57)
plot(C1204SOC,C1204OCV,C1204SOC,Vmodel_Exponential_C1204,C1204SOC,V_Error_Exponential
_C1204,'LineWidth',3)
title('Error for Exponential Model Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Exponential','Error')

%% C1205
V_Error_Exponential_C1205 = [C1205OCV'-(Vmodel_Exponential_C1205)];
figure(58)
plot(C1205SOC,C1205OCV,C1205SOC,Vmodel_Exponential_C1205,C1205SOC,V_Error_Exponential
_C1205,'LineWidth',3)
title('Error for Exponential Model Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Vo'); %give y axis label
legend('V Data','Vmodel Exponential','Error')

%% All errors for C1202
figure(59)
plot(C1202SOC,V_Error_Linear_C1202,C1202SOC,V_Error_Shepard_C1202,C1202SOC,V_Error_Ne
rnst_C1202,C1202SOC,V_Error_Combined_C1202,C1202SOC,V_Error_Combined3_C1202,C1202SOC,
V_Error_Polynomial_C1202,C1202SOC,V_Error_Exponential_C1202,'LineWidth',3)
title('Error for all models in Battery C1202')
xlabel('s'); %give x-axis label
ylabel('Error'); %give y axis label
legend('Linear Model','Shepard Model','Nernst Model','Combined Model','Combined+3
Model','Polynomial Model','Exponential Model' )

%% All errors for C1203
figure(60)
plot(C1203SOC,V_Error_Linear_C1203,C1203SOC,V_Error_Shepard_C1203,C1203SOC,V_Error_Ne
rnst_C1203,C1203SOC,V_Error_Combined_C1203,C1203SOC,V_Error_Combined3_C1203,C1203SOC,
V_Error_Polynomial_C1203,C1203SOC,V_Error_Exponential_C1203,'LineWidth',3)
title('Error for all models in Battery C1203')
xlabel('s'); %give x-axis label
ylabel('Error'); %give y axis label
legend('Linear Model','Shepard Model','Nernst Model','Combined Model','Combined+3
Model','Polynomial Model','Exponential Model' )

%% All errors for C1204
figure(61)
plot(C1204SOC,V_Error_Linear_C1204,C1204SOC,V_Error_Shepard_C1204,C1204SOC,V_Error_Ne
rnst_C1204,C1204SOC,V_Error_Combined_C1204,C1204SOC,V_Error_Combined3_C1204,C1204SOC,
V_Error_Polynomial_C1204,C1204SOC,V_Error_Exponential_C1204,'LineWidth',3)
title('Error for all models in Battery C1204')
xlabel('s'); %give x-axis label
ylabel('Error'); %give y axis label
```

```
legend('Linear Model','Shepard Model','Nernst Model','Combined Model','Combined+3
Model','Polynomial Model','Exponential Model' )

%% All errors for C1205
figure(62)
plot(C1205SOC,V_Error_Linear_C1205,C1205SOC,V_Error_Shepard_C1205,C1205SOC,V_Error_Ne
rnst_C1205,C1205SOC,V_Error_Combined_C1205,C1205SOC,V_Error_Combined3_C1205,C1205SOC,
V_Error_Polynomial_C1205,C1205SOC,V_Error_Exponential_C1205,'LineWidth',3)
title('Error for all models in Battery C1205')
xlabel('s'); %give x-axis label
ylabel('Error'); %give y axis label
legend('Linear Model','Shepard Model','Nernst Model','Combined Model','Combined+3
Model','Polynomial Model','Exponential Model' )

%% Question 4

%% Best Fit of all Batteries for all Models
%% Best Fit for Linear Model for all Batteries
Bestfit_Linear_C1202 = (1-((norm(Vmodel_Linear_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Linear_C1202))))))*100;
Bestfit_Linear_C1203 = (1-((norm(Vmodel_Linear_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Linear_C1203))))))*100;
Bestfit_Linear_C1204 = (1-((norm(Vmodel_Linear_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Linear_C1204))))))*100;
Bestfit_Linear_C1205 = (1-((norm(Vmodel_Linear_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Linear_C1205))))))*100;
%% Best Fit for shepard Model for all Batteries
Bestfit_Shepard_C1202 = (1-((norm(Vmodel_Shepard_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Shepard_C1202))))))*100;
Bestfit_Shepard_C1203 = (1-((norm(Vmodel_Shepard_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Shepard_C1203))))))*100;
Bestfit_Shepard_C1204 = (1-((norm(Vmodel_Shepard_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Shepard_C1204))))))*100;
Bestfit_Shepard_C1205 = (1-((norm(Vmodel_Shepard_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Shepard_C1205))))))*100;
%% Best Fit for Nernst Model for all Batteries
Bestfit_Nernst_C1202 = (1-((norm(Vmodel_Nernst_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Nernst_C1202))))))*100;
Bestfit_Nernst_C1203 = (1-((norm(Vmodel_Nernst_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Nernst_C1203))))))*100;
Bestfit_Nernst_C1204 = (1-((norm(Vmodel_Nernst_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Nernst_C1204))))))*100;
Bestfit_Nernst_C1205 = (1-((norm(Vmodel_Nernst_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Nernst_C1205))))))*100;
%% Best Fit for Combined Model for all Batteries
Bestfit_Combined_C1202 = (1-((norm(Vmodel_Combined_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Combined_C1202))))))*100;
Bestfit_Combined_C1203 = (1-((norm(Vmodel_Combined_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Combined_C1203))))))*100;
Bestfit_Combined_C1204 = (1-((norm(Vmodel_Combined_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Combined_C1204))))))*100;
Bestfit_Combined_C1205 = (1-((norm(Vmodel_Combined_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Combined_C1205))))))*100;
%% Best fit for Combined+3 Model for all Batteries
```

```
Bestfit_Combined3_C1202 = (1-((norm(Vmodel_Combined3_C1202-
C1202OCV')/(norm(C1202OCV'-mean(Vmodel_Combined3_C1202))))))*100;
Bestfit_Combined3_C1203 = (1-((norm(Vmodel_Combined3_C1203-
C1203OCV')/(norm(C1203OCV'-mean(Vmodel_Combined3_C1203))))))*100;
Bestfit_Combined3_C1204 = (1-((norm(Vmodel_Combined3_C1204-
C1204OCV')/(norm(C1204OCV'-mean(Vmodel_Combined3_C1204))))))*100;
Bestfit_Combined3_C1205 = (1-((norm(Vmodel_Combined3_C1205-
C1205OCV')/(norm(C1205OCV'-mean(Vmodel_Combined3_C1205))))))*100;
%% Best fit for Polynomial Model for all Batteries
Bestfit_Polynomial_C1202 = (1-((norm(Vmodel_Polynomial_C1202-
C1202OCV')/(norm(C1202OCV'-mean(Vmodel_Polynomial_C1202))))))*100;
Bestfit_Polynomial_C1203 = (1-((norm(Vmodel_Polynomial_C1203-
C1203OCV')/(norm(C1203OCV'-mean(Vmodel_Polynomial_C1203))))))*100;
Bestfit_Polynomial_C1204 = (1-((norm(Vmodel_Polynomial_C1204-
C1204OCV')/(norm(C1204OCV'-mean(Vmodel_Polynomial_C1204))))))*100;
Bestfit_Polynomial_C1205 = (1-((norm(Vmodel_Polynomial_C1205-
C1205OCV')/(norm(C1205OCV'-mean(Vmodel_Polynomial_C1205))))))*100;
%% Best fit for Exponential Model for all Batteries
Bestfit_Exponential_C1202 = (1-((norm(Vmodel_Exponential_C1202-
C1202OCV')/(norm(C1202OCV'-mean(Vmodel_Exponential_C1202))))))*100;
Bestfit_Exponential_C1203 = (1-((norm(Vmodel_Exponential_C1203-
C1203OCV')/(norm(C1203OCV'-mean(Vmodel_Exponential_C1203))))))*100;
Bestfit_Exponential_C1204 = (1-((norm(Vmodel_Exponential_C1204-
C1204OCV')/(norm(C1204OCV'-mean(Vmodel_Exponential_C1204))))))*100;
Bestfit_Exponential_C1205 = (1-((norm(Vmodel_Exponential_C1205-
C1205OCV')/(norm(C1205OCV'-mean(Vmodel_Exponential_C1205))))))*100;

%% R^2 of all Batteries for all Models
%% R^2 for Linear Model for all Batteries
Rsquare_Linear_C1202 = (1-(((norm(Vmodel_Linear_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Linear_C1202))))).^2))*100;
Rsquare_Linear_C1203 = (1-(((norm(Vmodel_Linear_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Linear_C1203))))).^2))*100;
Rsquare_Linear_C1204 = (1-(((norm(Vmodel_Linear_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Linear_C1204))))).^2))*100;
Rsquare_Linear_C1205 = (1-(((norm(Vmodel_Linear_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Linear_C1205))))).^2))*100;
%% R^2 for shepard Model for all Batteries
Rsquare_Shepard_C1202 = (1-(((norm(Vmodel_Shepard_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Shepard_C1202))))).^2))*100;
Rsquare_Shepard_C1203 = (1-(((norm(Vmodel_Shepard_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Shepard_C1203))))).^2))*100;
Rsquare_Shepard_C1204 = (1-(((norm(Vmodel_Shepard_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Shepard_C1204))))).^2))*100;
Rsquare_Shepard_C1205 = (1-(((norm(Vmodel_Shepard_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Shepard_C1205))))).^2))*100;
%% R^2 for Nernst Model for all Batteries
Rsquare_Nernst_C1202 = (1-(((norm(Vmodel_Nernst_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Nernst_C1202))))).^2))*100;
Rsquare_Nernst_C1203 = (1-(((norm(Vmodel_Nernst_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Nernst_C1203))))).^2))*100;
Rsquare_Nernst_C1204 = (1-(((norm(Vmodel_Nernst_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Nernst_C1204))))).^2))*100;
Rsquare_Nernst_C1205 = (1-(((norm(Vmodel_Nernst_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Nernst_C1205))))).^2))*100;
```

```
%% R^2 for Combined Model for all Batteries
Rsquare_Combined_C1202 = (1-(((norm(Vmodel_Combined_C1202-C1202OCV')/(norm(C1202OCV'-
mean(Vmodel_Combined_C1202))))).^2))*100;
Rsquare_Combined_C1203 = (1-(((norm(Vmodel_Combined_C1203-C1203OCV')/(norm(C1203OCV'-
mean(Vmodel_Combined_C1203))))).^2))*100;
Rsquare_Combined_C1204 = (1-(((norm(Vmodel_Combined_C1204-C1204OCV')/(norm(C1204OCV'-
mean(Vmodel_Combined_C1204))))).^2))*100;
Rsquare_Combined_C1205 = (1-(((norm(Vmodel_Combined_C1205-C1205OCV')/(norm(C1205OCV'-
mean(Vmodel_Combined_C1205))))).^2))*100;
%% R^2 for Combined+3 Model for all Batteries
Rsquare_Combined3_C1202 = (1-(((norm(Vmodel_Combined3_C1202-
C1202OCV')/(norm(C1202OCV'-mean(Vmodel_Combined3_C1202))))).^2))*100;
Rsquare_Combined3_C1203 = (1-(((norm(Vmodel_Combined3_C1203-
C1203OCV')/(norm(C1203OCV'-mean(Vmodel_Combined3_C1203))))).^2))*100;
Rsquare_Combined3_C1204 = (1-(((norm(Vmodel_Combined3_C1204-
C1204OCV')/(norm(C1204OCV'-mean(Vmodel_Combined3_C1204))))).^2))*100;
Rsquare_Combined3_C1205 = (1-(((norm(Vmodel_Combined3_C1205-
C1205OCV')/(norm(C1205OCV'-mean(Vmodel_Combined3_C1205))))).^2))*100;
%% R^2 for Polynomial Model for all Batteries
Rsquare_Polynomial_C1202 = (1-(((norm(Vmodel_Polynomial_C1202-
C1202OCV')/(norm(C1202OCV'-mean(Vmodel_Polynomial_C1202))))).^2))*100;
Rsquare_Polynomial_C1203 = (1-(((norm(Vmodel_Polynomial_C1203-
C1203OCV')/(norm(C1203OCV'-mean(Vmodel_Polynomial_C1203))))).^2))*100;
Rsquare_Polynomial_C1204 = (1-(((norm(Vmodel_Polynomial_C1204-
C1204OCV')/(norm(C1204OCV'-mean(Vmodel_Polynomial_C1204))))).^2))*100;
Rsquare_Polynomial_C1205 = (1-(((norm(Vmodel_Polynomial_C1205-
C1205OCV')/(norm(C1205OCV'-mean(Vmodel_Polynomial_C1205))))).^2))*100;
%% R^2 for Exponential Model for all Batteries
Rsquare_Exponential_C1202 = (1-(((norm(Vmodel_Exponential_C1202-
C1202OCV')/(norm(C1202OCV'-mean(Vmodel_Exponential_C1202))))).^2))*100;
Rsquare_Exponential_C1203 = (1-(((norm(Vmodel_Exponential_C1203-
C1203OCV')/(norm(C1203OCV'-mean(Vmodel_Exponential_C1203))))).^2))*100;
Rsquare_Exponential_C1204 = (1-(((norm(Vmodel_Exponential_C1204-
C1204OCV')/(norm(C1204OCV'-mean(Vmodel_Exponential_C1204))))).^2))*100;
Rsquare_Exponential_C1205 = (1-(((norm(Vmodel_Exponential_C1205-
C1205OCV')/(norm(C1205OCV'-mean(Vmodel_Exponential_C1205))))).^2))*100;

%% Max Error of all Batteries for all model

%% Linear Model

MaxError_Linear_C1202 = max(norm(C1202OCV'-Vmodel_Linear_C1202));
MaxError_Linear_C1203 = max(norm(C1203OCV'-Vmodel_Linear_C1203));
MaxError_Linear_C1204 = max(norm(C1204OCV'-Vmodel_Linear_C1204));
MaxError_Linear_C1205 = max(norm(C1205OCV'-Vmodel_Linear_C1205));

%% Shepard Model

MaxError_Shepard_C1202 = max(norm(C1202OCV'-Vmodel_Shepard_C1202));
MaxError_Shepard_C1203 = max(norm(C1203OCV'-Vmodel_Shepard_C1203));
MaxError_Shepard_C1204 = max(norm(C1204OCV'-Vmodel_Shepard_C1204));
MaxError_Shepard_C1205 = max(norm(C1205OCV'-Vmodel_Shepard_C1205));

%% Nernst Model
```

```
MaxError_Nernst_C1202 = max(norm(C1202OCV'-Vmodel_Nernst_C1202));
MaxError_Nersnt_C1203 = max(norm(C1203OCV'-Vmodel_Nernst_C1203));
MaxError_Nernst_C1204 = max(norm(C1204OCV'-Vmodel_Nernst_C1204));
MaxError_Nernst_C1205 = max(norm(C1205OCV'-Vmodel_Nernst_C1205));

%% Combined Model

MaxError_Combined_C1202 = max(norm(C1202OCV'-Vmodel_Combined_C1202));
MaxError_Combined_C1203 = max(norm(C1203OCV'-Vmodel_Combined_C1203));
MaxError_Combined_C1204 = max(norm(C1204OCV'-Vmodel_Combined_C1204));
MaxError_Combined_C1205 = max(norm(C1205OCV'-Vmodel_Combined_C1205));

%% Combined+3 Model

MaxError_Combined3_C1202 = max(norm(C1202OCV'-Vmodel_Combined3_C1202));
MaxError_Combined3_C1203 = max(norm(C1203OCV'-Vmodel_Combined3_C1203));
MaxError_Combined3_C1204 = max(norm(C1204OCV'-Vmodel_Combined3_C1204));
MaxError_Combined3_C1205 = max(norm(C1205OCV'-Vmodel_Combined3_C1205));

%% Polynomial Model

MaxError_Polynomial_C1202 = max(norm(C1202OCV'-Vmodel_Polynomial_C1202));
MaxError_Polynomial_C1203 = max(norm(C1203OCV'-Vmodel_Polynomial_C1203));
MaxError_Polynomial_C1204 = max(norm(C1204OCV'-Vmodel_Polynomial_C1204));
MaxError_Polynomial_C1205 = max(norm(C1205OCV'-Vmodel_Polynomial_C1205));

%% Exponential Model

MaxError_Exponential_C1202 = max(norm(C1202OCV'-Vmodel_Exponential_C1202));
MaxError_Exponential_C1203 = max(norm(C1203OCV'-Vmodel_Exponential_C1203));
MaxError_Exponential_C1204 = max(norm(C1204OCV'-Vmodel_Exponential_C1204));
MaxError_Exponential_C1205 = max(norm(C1205OCV'-Vmodel_Exponential_C1205));

%% RMSE of all models for all batteries
%% Linear Model

RMSE_Linear_C1202 = ((norm(C1202OCV'-Vmodel_Linear_C1202)/(sqrt(length(C1202OCV')-
length(K_Linear_C1202)))));
RMSE_Linear_C1203 = ((norm(C1203OCV'-Vmodel_Linear_C1203)/(sqrt(length(C1203OCV')-
length(K_Linear_C1203)))));
RMSE_Linear_C1204 = ((norm(C1204OCV'-Vmodel_Linear_C1204)/(sqrt(length(C1204OCV')-
length(K_Linear_C1204)))));
RMSE_Linear_C1205 = ((norm(C1205OCV'-Vmodel_Linear_C1205)/(sqrt(length(C1205OCV')-
length(K_Linear_C1205)))));

%% Shepard Model

RMSE_Shepard_C1202 = ((norm(C1202OCV'-Vmodel_Shepard_C1202)/(sqrt(length(C1202OCV')-
length(K_Shepard_C1202)))));
RMSE_Shepard_C1203 = ((norm(C1203OCV'-Vmodel_Shepard_C1203)/(sqrt(length(C1203OCV')-
length(K_Shepard_C1203)))));
RMSE_Shepard_C1204 = ((norm(C1204OCV'-Vmodel_Shepard_C1204)/(sqrt(length(C1204OCV')-
length(K_Shepard_C1204)))));
RMSE_Shepard_C1205 = ((norm(C1205OCV'-Vmodel_Shepard_C1205)/(sqrt(length(C1205OCV')-
length(K_Shepard_C1205)))));
```

```
%% Nernst Model

RMSE_Nernst_C1202 = ((norm(C1202OCV'-Vmodel_Nernst_C1202)/(sqrt(length(C1202OCV')-
length(K_Nernst_C1202)))));
RMSE_Nernst_C1203 = ((norm(C1203OCV'-Vmodel_Nernst_C1203)/(sqrt(length(C1203OCV')-
length(K_Nernst_C1203)))));
RMSE_Nernst_C1204 = ((norm(C1204OCV'-Vmodel_Nernst_C1204)/(sqrt(length(C1204OCV')-
length(K_Nernst_C1204)))));
RMSE_Nernst_C1205 = ((norm(C1205OCV'-Vmodel_Nernst_C1205)/(sqrt(length(C1205OCV')-
length(K_Nernst_C1205)))));

%% Combined Model

RMSE_Combined_C1202 = ((norm(C1202OCV'-
Vmodel_Combined_C1202)/(sqrt(length(C1202OCV')-length(K_Combined_C1202)))));
RMSE_Combined_C1203 = ((norm(C1203OCV'-
Vmodel_Combined_C1203)/(sqrt(length(C1203OCV')-length(K_Combined_C1203)))));
RMSE_Combined_C1204 = ((norm(C1204OCV'-
Vmodel_Combined_C1204)/(sqrt(length(C1204OCV')-length(K_Combined_C1204)))));
RMSE_Combined_C1205 = ((norm(C1205OCV'-
Vmodel_Combined_C1205)/(sqrt(length(C1205OCV')-length(K_Combined_C1205)))));

%% Combined+3 Model

RMSE_Combined3_C1202 = ((norm(C1202OCV'-
Vmodel_Combined3_C1202)/(sqrt(length(C1202OCV')-length(K_Combined3_C1202)))));
RMSE_Combined3_C1203 = ((norm(C1203OCV'-
Vmodel_Combined3_C1203)/(sqrt(length(C1203OCV')-length(K_Combined3_C1203)))));
RMSE_Combined3_C1204 = ((norm(C1204OCV'-
Vmodel_Combined3_C1204)/(sqrt(length(C1204OCV')-length(K_Combined3_C1204)))));
RMSE_Combined3_C1205 = ((norm(C1205OCV'-
Vmodel_Combined3_C1205)/(sqrt(length(C1205OCV')-length(K_Combined3_C1205)))));

%% Polynomial Model

RMSE_Polynomial_C1202 = ((norm(C1202OCV'-
Vmodel_Polynomial_C1202)/(sqrt(length(C1202OCV')-length(K_Polynomial_C1202)))));
RMSE_Polynomial_C1203 = ((norm(C1203OCV'-
Vmodel_Polynomial_C1203)/(sqrt(length(C1203OCV')-length(K_Polynomial_C1203)))));
RMSE_Polynomial_C1204 = ((norm(C1204OCV'-
Vmodel_Polynomial_C1204)/(sqrt(length(C1204OCV')-length(K_Polynomial_C1204)))));
RMSE_Polynomial_C1205 = ((norm(C1205OCV'-
Vmodel_Polynomial_C1205)/(sqrt(length(C1205OCV')-length(K_Polynomial_C1205)))));

%% Exponential Model

RMSE_Exponential_C1202 = ((norm(C1202OCV'-
Vmodel_Exponential_C1202)/(sqrt(length(C1202OCV')-length(K_Exponential_C1202)))));
RMSE_Exponential_C1203 = ((norm(C1203OCV'-
Vmodel_Exponential_C1203)/(sqrt(length(C1203OCV')-length(K_Exponential_C1203)))));
RMSE_Exponential_C1204 = ((norm(C1204OCV'-
Vmodel_Exponential_C1204)/(sqrt(length(C1204OCV')-length(K_Exponential_C1204)))));
RMSE_Exponential_C1205 = ((norm(C1205OCV'-
Vmodel_Exponential_C1205)/(sqrt(length(C1205OCV')-length(K_Exponential_C1205)))));
```

```
%% AIC of All Model for all Batteries

%% Linear Model

e_Linear_C1202 = (C1202OCV'-Vmodel_Linear_C1202);
S_Linear_C1202_2 = sum(e_Linear_C1202.^2);
AIC_Linear_C1202 =
length(C1202OCV)*log((S_Linear_C1202_2)/(length(C1202OCV')))+2*(length(K_Linear_C1202
)+1)


e_Linear_C1203 = (C1203OCV'-Vmodel_Linear_C1203);
S_Linear_C1203_2 = sum(e_Linear_C1203.^2);
AIC_Linear_C1203 =
length(C1203OCV)*log((S_Linear_C1203_2)/(length(C1203OCV')))+2*(length(K_Linear_C1203
)+1)

e_Linear_C1204 = (C1204OCV'-Vmodel_Linear_C1204);
S_Linear_C1204_2 = sum(e_Linear_C1204.^2);
AIC_Linear_C1204 =
length(C1204OCV)*log((S_Linear_C1204_2)/(length(C1204OCV')))+2*(length(K_Linear_C1204
)+1)

e_Linear_C1205 = (C1205OCV'-Vmodel_Linear_C1205);
S_Linear_C1205_2 = sum(e_Linear_C1205.^2);
AIC_Linear_C1205 =
length(C1205OCV)*log((S_Linear_C1205_2)/(length(C1205OCV')))+2*(length(K_Linear_C1205
)+1)


%% Shepard Model

e_Shepard_C1202 = (C1202OCV'-Vmodel_Shepard_C1202);
S_Shepard_C1202_2 = sum(e_Shepard_C1202.^2);
AIC_Shepard_C1202 =
length(C1202OCV)*log((S_Shepard_C1202_2)/(length(C1202OCV')))+2*(length(K_Shepard_C12
02)+1)


e_Shepard_C1203 = (C1203OCV'-Vmodel_Shepard_C1203);
S_Shepard_C1203_2 = sum(e_Shepard_C1203.^2);
AIC_Shepard_C1203 =
length(C1203OCV)*log((S_Shepard_C1203_2)/(length(C1203OCV')))+2*(length(K_Shepard_C12
03)+1)

e_Shepard_C1204 = (C1204OCV'-Vmodel_Shepard_C1204);
S_Shepard_C1204_2 = sum(e_Shepard_C1204.^2);
AIC_Shepard_C1204 =
length(C1204OCV)*log((S_Shepard_C1204_2)/(length(C1204OCV')))+2*(length(K_Shepard_C12
04)+1)

e_Shepard_C1205 = (C1205OCV'-Vmodel_Shepard_C1205);
S_Shepard_C1205_2 = sum(e_Shepard_C1205.^2);
```

```
AIC_Shepard_C1205 =
length(C1205OCV)*log((S_Shepard_C1205_2)/(length(C1205OCV')))+2*(length(K_Shepard_C12
05)+1)


%% Nernst Model

e_Nernst_C1202 = (C1202OCV'-Vmodel_Nernst_C1202);
S_Nernst_C1202_2 = sum(e_Nernst_C1202.^2);
AIC_Nernst_C1202 =
length(C1202OCV)*log((S_Nernst_C1202_2)/(length(C1202OCV')))+2*(length(K_Nernst_C1202
)+1)


e_Nernst_C1203 = (C1203OCV'-Vmodel_Nernst_C1203);
S_Nernst_C1203_2 = sum(e_Nernst_C1203.^2);
AIC_Nernst_C1203 =
length(C1203OCV)*log((S_Nernst_C1203_2)/(length(C1203OCV')))+2*(length(K_Nernst_C1203
)+1)

e_Nernst_C1204 = (C1204OCV'-Vmodel_Nernst_C1204);
S_Nernst_C1204_2 = sum(e_Nernst_C1204.^2);
AIC_Nernst_C1204 =
length(C1204OCV)*log((S_Nernst_C1204_2)/(length(C1204OCV')))+2*(length(K_Nernst_C1204
)+1)

e_Nernst_C1205 = (C1205OCV'-Vmodel_Nernst_C1205);
S_Nernst_C1205_2 = sum(e_Nernst_C1205.^2);
AIC_Nernst_C1205 =
length(C1205OCV)*log((S_Nernst_C1205_2)/(length(C1205OCV')))+2*(length(K_Nernst_C1205
)+1)

%% Combined Model

e_Combined_C1202 = (C1202OCV'-Vmodel_Combined_C1202);
S_Combined_C1202_2 = sum(e_Combined_C1202.^2);
AIC_Combined_C1202 =
length(C1202OCV)*log((S_Combined_C1202_2)/(length(C1202OCV')))+2*(length(K_Combined_C
1202)+1)


e_Combined_C1203 = (C1203OCV'-Vmodel_Combined_C1203);
S_Combined_C1203_2 = sum(e_Combined_C1203.^2);
AIC_Combined_C1203 =
length(C1203OCV)*log((S_Combined_C1203_2)/(length(C1203OCV')))+2*(length(K_Combined_C
1203)+1)

e_Combined_C1204 = (C1204OCV'-Vmodel_Combined_C1204);
S_Combined_C1204_2 = sum(e_Combined_C1204.^2);
AIC_Combined_C1204 =
length(C1204OCV)*log((S_Combined_C1204_2)/(length(C1204OCV')))+2*(length(K_Combined_C
1204)+1)

e_Combined_C1205 = (C1205OCV'-Vmodel_Combined_C1205);
S_Combined_C1205_2 = sum(e_Combined_C1205.^2);
```

```
AIC_Combined_C1205 =
length(C1205OCV)*log((S_Combined_C1205_2)/(length(C1205OCV')))+2*(length(K_Combined_C
1205)+1)


%% Combined+3 Model

e_Combined3_C1202 = (C1202OCV'-Vmodel_Combined3_C1202);
S_Combined3_C1202_2 = sum(e_Combined3_C1202.^2);
AIC_Combined3_C1202 =
length(C1202OCV)*log((S_Combined3_C1202_2)/(length(C1202OCV')))+2*(length(K_Combined3
_C1202)+1)


e_Combined3_C1203 = (C1203OCV'-Vmodel_Combined3_C1203);
S_Combined3_C1203_2 = sum(e_Combined3_C1203.^2);
AIC_Combined3_C1203 =
length(C1203OCV)*log((S_Combined3_C1203_2)/(length(C1203OCV')))+2*(length(K_Combined3
_C1203)+1)

e_Combined3_C1204 = (C1204OCV'-Vmodel_Combined3_C1204);
S_Combined3_C1204_2 = sum(e_Combined3_C1204.^2);
AIC_Combined3_C1204 =
length(C1204OCV)*log((S_Combined3_C1204_2)/(length(C1204OCV')))+2*(length(K_Combined3
_C1204)+1)

e_Combined3_C1205 = (C1205OCV'-Vmodel_Combined3_C1205);
S_Combined3_C1205_2 = sum(e_Combined3_C1205.^2);
AIC_Combined3_C1205 =
length(C1205OCV)*log((S_Combined3_C1205_2)/(length(C1205OCV')))+2*(length(K_Combined3
_C1205)+1)


%% Polynomial Model

e_Polynomial_C1202 = (C1202OCV'-Vmodel_Polynomial_C1202);
S_Polynomial_C1202_2 = sum(e_Polynomial_C1202.^2);
AIC_Polynomial_C1202 =
length(C1202OCV)*log((S_Polynomial_C1202_2)/(length(C1202OCV')))+2*(length(K_Polynomi
al_C1202)+1)


e_Polynomial_C1203 = (C1203OCV'-Vmodel_Polynomial_C1203);
S_Polynomial_C1203_2 = sum(e_Polynomial_C1203.^2);
AIC_Polynomial_C1203 =
length(C1203OCV)*log((S_Polynomial_C1203_2)/(length(C1203OCV')))+2*(length(K_Polynomi
al_C1203)+1)

e_Polynomial_C1204 = (C1204OCV'-Vmodel_Polynomial_C1204);
S_Polynomial_C1204_2 = sum(e_Polynomial_C1204.^2);
AIC_Polynomial_C1204 =
length(C1204OCV)*log((S_Polynomial_C1204_2)/(length(C1204OCV')))+2*(length(K_Polynomi
al_C1204)+1)

e_Polynomial_C1205 = (C1205OCV'-Vmodel_Polynomial_C1205);
```

```
S_Polynomial_C1205_2 = sum(e_Polynomial_C1205.^2);
AIC_Polynomial_C1205 =
length(C1205OCV)*log((S_Polynomial_C1205_2)/(length(C1205OCV')))+2*(length(K_Polynomi
al_C1205)+1)

%% Exponential Model

e_Exponential_C1202 = (C1202OCV'-Vmodel_Exponential_C1202);
S_Exponential_C1202_2 = sum(e_Exponential_C1202.^2);
AIC_Exponential_C1202 =
length(C1202OCV)*log((S_Exponential_C1202_2)/(length(C1202OCV')))+2*(length(K_Exponen
tial_C1202)+1)


e_Exponential_C1203 = (C1203OCV'-Vmodel_Exponential_C1203);
S_Exponential_C1203_2 = sum(e_Exponential_C1203.^2);
AIC_Exponential_C1203 =
length(C1203OCV)*log((S_Exponential_C1203_2)/(length(C1203OCV')))+2*(length(K_Exponen
tial_C1203)+1)

e_Exponential_C1204 = (C1204OCV'-Vmodel_Exponential_C1204);
S_Exponential_C1204_2 = sum(e_Exponential_C1204.^2);
AIC_Exponential_C1204 =
length(C1204OCV)*log((S_Exponential_C1204_2)/(length(C1204OCV')))+2*(length(K_Exponen
tial_C1204)+1)

e_Exponential_C1205 = (C1205OCV'-Vmodel_Exponential_C1205);
S_Exponential_C1205_2 = sum(e_Exponential_C1205.^2);
AIC_Exponential_C1205 =
length(C1205OCV)*log((S_Exponential_C1205_2)/(length(C1205OCV')))+2*(length(K_Exponen
tial_C1205)+1)

%% Table Matrice
%% For C1202

Model_Name = ["Linear Model";"Shepard Model";"Nernst Model";"Combined
Model";"Combined+3 Model";"Polynomial Model";"Exponential Model"];
AIC_C1202=
[AIC_Linear_C1202;AIC_Shepard_C1202;AIC_Nernst_C1202;AIC_Combined_C1202;AIC_Combined3
_C1202;AIC_Polynomial_C1202;AIC_Exponential_C1202];
RMSE_C1202=[RMSE_Linear_C1202;RMSE_Shepard_C1202;RMSE_Nernst_C1202;RMSE_Combined_C120
2;RMSE_Combined3_C1202;RMSE_Polynomial_C1202;RMSE_Exponential_C1202];
Rsquare_C1202=[Rsquare_Linear_C1202;Rsquare_Shepard_C1202;Rsquare_Nernst_C1202;Rsquar
e_Combined_C1202;Rsquare_Combined3_C1202;Rsquare_Polynomial_C1202;Rsquare_Exponential
_C1202];
BF_C1202 =
[Bestfit_Linear_C1202;Bestfit_Shepard_C1202;Bestfit_Nernst_C1202;Bestfit_Combined_C12
02;Bestfit_Combined3_C1202;Bestfit_Polynomial_C1202;Bestfit_Exponential_C1202];
Max_Error_C1202 =
[MaxError_Linear_C1202;MaxError_Shepard_C1202;MaxError_Nernst_C1202;MaxError_Combined
_C1202;MaxError_Combined3_C1202;MaxError_Polynomial_C1202;MaxError_Exponential_C1202]
;

BatteryC1202 =
table(Model_Name,AIC_C1202,RMSE_C1202,Rsquare_C1202,BF_C1202,Max_Error_C1202)
```

```
%% For C1203

Model_Name = ["Linear Model";"Shepard Model";"Nernst Model";"Combined
Model";"Combined+3 Model";"Polynomial Model";"Exponential Model"];
AIC_C1203=
[AIC_Linear_C1203;AIC_Shepard_C1203;AIC_Nernst_C1203;AIC_Combined_C1203;AIC_Combined3
_C1203;AIC_Polynomial_C1203;AIC_Exponential_C1203];
RMSE_C1203=[RMSE_Linear_C1203;RMSE_Shepard_C1203;RMSE_Nernst_C1203;RMSE_Combined_C120
3;RMSE_Combined3_C1203;RMSE_Polynomial_C1203;RMSE_Exponential_C1203];
Rsquare_C1203=[Rsquare_Linear_C1203;Rsquare_Shepard_C1203;Rsquare_Nernst_C1203;Rsquar
e_Combined_C1203;Rsquare_Combined3_C1203;Rsquare_Polynomial_C1203;Rsquare_Exponential
_C1203];
BF_C1203 =
[Bestfit_Linear_C1203;Bestfit_Shepard_C1203;Bestfit_Nernst_C1203;Bestfit_Combined_C12
03;Bestfit_Combined3_C1203;Bestfit_Polynomial_C1203;Bestfit_Exponential_C1203];
Max_Error_C1203 =
[MaxError_Linear_C1203;MaxError_Shepard_C1203;MaxError_Nersnt_C1203;MaxError_Combined
_C1203;MaxError_Combined3_C1203;MaxError_Polynomial_C1203;MaxError_Exponential_C1203]
;

BatteryC1203 =
table(Model_Name,AIC_C1203,RMSE_C1203,Rsquare_C1203,BF_C1203,Max_Error_C1203)

%% For C1204

Model_Name = ["Linear Model";"Shepard Model";"Nernst Model";"Combined
Model";"Combined+3 Model";"Polynomial Model";"Exponential Model"];
AIC_C1204=
[AIC_Linear_C1204;AIC_Shepard_C1204;AIC_Nernst_C1204;AIC_Combined_C1204;AIC_Combined3
_C1204;AIC_Polynomial_C1204;AIC_Exponential_C1204];
RMSE_C1204=[RMSE_Linear_C1204;RMSE_Shepard_C1204;RMSE_Nernst_C1204;RMSE_Combined_C120
4;RMSE_Combined3_C1204;RMSE_Polynomial_C1204;RMSE_Exponential_C1204];
Rsquare_C1204=[Rsquare_Linear_C1204;Rsquare_Shepard_C1204;Rsquare_Nernst_C1204;Rsquar
e_Combined_C1204;Rsquare_Combined3_C1204;Rsquare_Polynomial_C1204;Rsquare_Exponential
_C1204];
BF_C1204 =
[Bestfit_Linear_C1204;Bestfit_Shepard_C1204;Bestfit_Nernst_C1204;Bestfit_Combined_C12
04;Bestfit_Combined3_C1204;Bestfit_Polynomial_C1204;Bestfit_Exponential_C1204];
Max_Error_C1204 =
[MaxError_Linear_C1204;MaxError_Shepard_C1204;MaxError_Nernst_C1204;MaxError_Combined
_C1204;MaxError_Combined3_C1204;MaxError_Polynomial_C1204;MaxError_Exponential_C1204]
;

BatteryC1204 =
table(Model_Name,AIC_C1204,RMSE_C1204,Rsquare_C1204,BF_C1204,Max_Error_C1204)


%% For C1205

Model_Name = ["Linear Model";"Shepard Model";"Nernst Model";"Combined
Model";"Combined+3 Model";"Polynomial Model";"Exponential Model"];
AIC_C1205=
[AIC_Linear_C1205;AIC_Shepard_C1205;AIC_Nernst_C1205;AIC_Combined_C1205;AIC_Combined3
_C1205;AIC_Polynomial_C1205;AIC_Exponential_C1205];
```

```
RMSE_C1205=[RMSE_Linear_C1205;RMSE_Shepard_C1205;RMSE_Nernst_C1205;RMSE_Combined_C120
5;RMSE_Combined3_C1205;RMSE_Polynomial_C1205;RMSE_Exponential_C1205];
Rsquare_C1205=[Rsquare_Linear_C1205;Rsquare_Shepard_C1205;Rsquare_Nernst_C1205;Rsquar
e_Combined_C1205;Rsquare_Combined3_C1205;Rsquare_Polynomial_C1205;Rsquare_Exponential
_C1205];
BF_C1205 =
[Bestfit_Linear_C1205;Bestfit_Shepard_C1205;Bestfit_Nernst_C1205;Bestfit_Combined_C12
05;Bestfit_Combined3_C1205;Bestfit_Polynomial_C1205;Bestfit_Exponential_C1205];
Max_Error_C1205 =
[MaxError_Linear_C1205;MaxError_Shepard_C1205;MaxError_Nernst_C1205;MaxError_Combined
_C1205;MaxError_Combined3_C1205;MaxError_Polynomial_C1205;MaxError_Exponential_C1205]
;

BatteryC1205 =
table(Model_Name,AIC_C1205,RMSE_C1205,Rsquare_C1205,BF_C1205,Max_Error_C1205)
```