Question 03

```
cable;
x = A\b;
A1 = x(1)
```

```
A1 = 7.3698e-04
```

```
A2 = x(2)
```

```
A2 = 1.6723e-05
```

```
A21 = x(3)
```

```
A21 = 0.0011
```

```
B21 = x(4)
```

```
B21 = -2.7987e-06
```

```
A22 = x(5)
```

```
A22 = 0.0011
```

```
B22 = x(6)
```

```
B22 = -2.7987e-06
```

Question 04

```
figure;
y1 = linspace (0,l1,20);
y21 = linspace (l1,l21,20);
y22 = linspace (l1,l22,20);
v1 = x(1)*exp(-y1) + x(2)*exp(y1);
v21 = x(3)*exp(-y21) + x(4)*exp(y21);
v22 = x(5)*exp(-y22) + x(6)*exp(y22);
plot (y1,v1, 'y-',y21, v21, 'r-',y22, v22, 'b-')
xlabel('X (dimensionless)')
ylabel('V (volts)')
title('Steady-state voltage - E5')
legend({'V1','V21','v3'})

xlim('auto')
ylim('auto')
```

Question 05

part (a)

```
A(2,:) = [0 0 -exp(-l21) exp(l21) 0 0];
x=A\b;
v1 = x(1)*exp(-y1) + x(2)*exp(y1);

v21 = x(3)*exp(-y21) + x(4)*exp(y21);
v22 = x(5)*exp(-y22) + x(6)*exp(y22);
plot (y1,v1, 'y-',y21, v21, 'r-',y22, v22, 'b-')
xlabel('X (dimensionless)')
ylabel('V (volts)')
title('Steady-state voltage - E5')
legend({'V1','V21','V22'})
```

part(b)

```
A(3,:) = [0 0 0 0 -exp(-l22) exp(l22)];
x=A\b;
y1 = linspace (0,l1,20);
y21 = linspace (l1,l21,20);
y22 = linspace (l1,l22,20);
v1 = x(1)*exp(-y1) + x(2)*exp(y1);

v21 = x(3)*exp(-y21) + x(4)*exp(y21);
v22 = x(5)*exp(-y22) + x(6)*exp(y22);
plot (y1,v1, 'y-',y21, v21, 'r-',y22, v22, 'b-')
xlabel('X (dimensionless)')
ylabel('V (volts)')
title('Steady-state voltage - E5')
legend({'V1','V21','V22'})
```

part (c)

```
b(1) = 0;
b(2) = rl21*iapp;
A(3,:) = [0 0 0 0 exp(-l22) exp(l22)];
x=A\b;

v1 = x(1)*exp(-y1) + x(2)*exp(y1);
v21 = x(3)*exp(-y21) + x(4)*exp(y21);
v22 = x(5)*exp(-y22) + x(6)*exp(y22);
plot (y1,v1, 'y-',y21, v21, 'r-',y22, v22, 'b-')
xlabel('X (dimensionless)')
```

```
ylabel('V (volts)')
title('Steady-state voltage - E5')
legend({'V1','V21','V22'})
xlim("Auto")
ylim("Auto")
```

part (d)

```
b(3) = rl22*iapp;
A(3,:) = [0 0 0 0 -exp(-l22) exp(l22)];
x=A\b;

v1 = x(1)*exp(-y1) + x(2)*exp(y1);
v21 = x(3)*exp(-y21) + x(4)*exp(y21);
v22 = x(5)*exp(-y22) + x(6)*exp(y22);
plot (y1,v1, 'y-',y21, v21, 'r-',y22, v22, 'b-')
xlabel('X (dimensionless)')
ylabel('V (volts)')
title('Steady-state voltage - E5')
legend({'V1','V21','V22'})
```

Question 06

```
d1 = 75e-4;    % cm
% d21 = 30e-4;    % cm
% d22 = 15e-4;    % cm
d21 = 47.2470e-4;       % E9 cm
d22 = d21;               % E9 cm

l1 = 1.5;   % dimensionless
l21 = 3.0;   % dimensionless
l22 = 3.0;   % dimensionless

% Electrical properties of compartments

Rm = 6e3;   % Ohms cm^2
Rc = 90;   % Ohms cm
Rs = 1e6;   % Ohms

c1 = 2*(Rc*Rm)^(1/2)/pi;

rl1 = c1*d1^(-3/2);  % Ohms
rl21 = c1*d21^(-3/2);  % Ohms
```

```
rl22 = c1*d22^(-3/2);  % Ohms
% Applied current

iapp = 1e-9;  % Amps

A = [1 -1 0 0 0 0;
     0 0 exp(-l21) exp(l21) 0 0;
     0 0 0 0 exp(-l22) exp(l22);
     exp(-l1) exp(l1) -exp(-l1) -exp(l1) 0 0;
     0 0 exp(-l1) exp(l1) -exp(-l1) -exp(l1);
     -exp(-l1) exp(l1) rl1*exp(-l1)/rl21 -rl1*exp(l1)/rl21 rl1*exp(-l1)/rl22 -rl1*exp(-l1)/rl2
```

```
b(1) = rl1*iapp;
b(2) = 0;
b(3) = 0;
A(2,:) = [0 0 -exp(-l21) exp(l21) 0 0];
A(3,:) = [0 0 0 0 -exp(-l22) exp(l22)];
x=A\b;
y1 = linspace (0,l1,20);
y21 = linspace (l1,l21,20);
y22 = linspace (l1,l22,20);
v1 = x(1)*exp(-y1) + x(2)*exp(y1);
v21 = x(3)*exp(-y21) + x(4)*exp(y21);
v22 = x(5)*exp(-y22) + x(6)*exp(y22);
plot (y1,v1, 'y-',y21, v21, 'r-',y22, v22, 'b-')
xlabel('X (dimensionless)')
ylabel('V (volts)')
title('Steady-state voltage - E5')
legend({'V1','V21','V22'})
```

```
b(1) = 0;
b(2) = rl21*iapp;
b(3) = rl22*iapp;
A(2,:) = [0 0 -exp(-l21) exp(l21) 0 0];
A(3,:) = [0 0 0 0 -exp(-l22) exp(l22)];
x=A\b;
y1 = linspace (0,l1,20);
y21 = linspace (l1,l21,20);
y22 = linspace (l1,l22,20);
v1 = x(1)*exp(-y1) + x(2)*exp(y1);
v21 = x(3)*exp(-y21) + x(4)*exp(y21);
v22 = x(5)*exp(-y22) + x(6)*exp(y22);
plot (y1,v1, 'y-',y21, v21, 'r-',y22, v22, 'b-')
xlabel('X (dimensionless)')
ylabel('V (volts)')
title('Steady-state voltage - E5')
```

```
legend({'V1','V21','V22'})
```