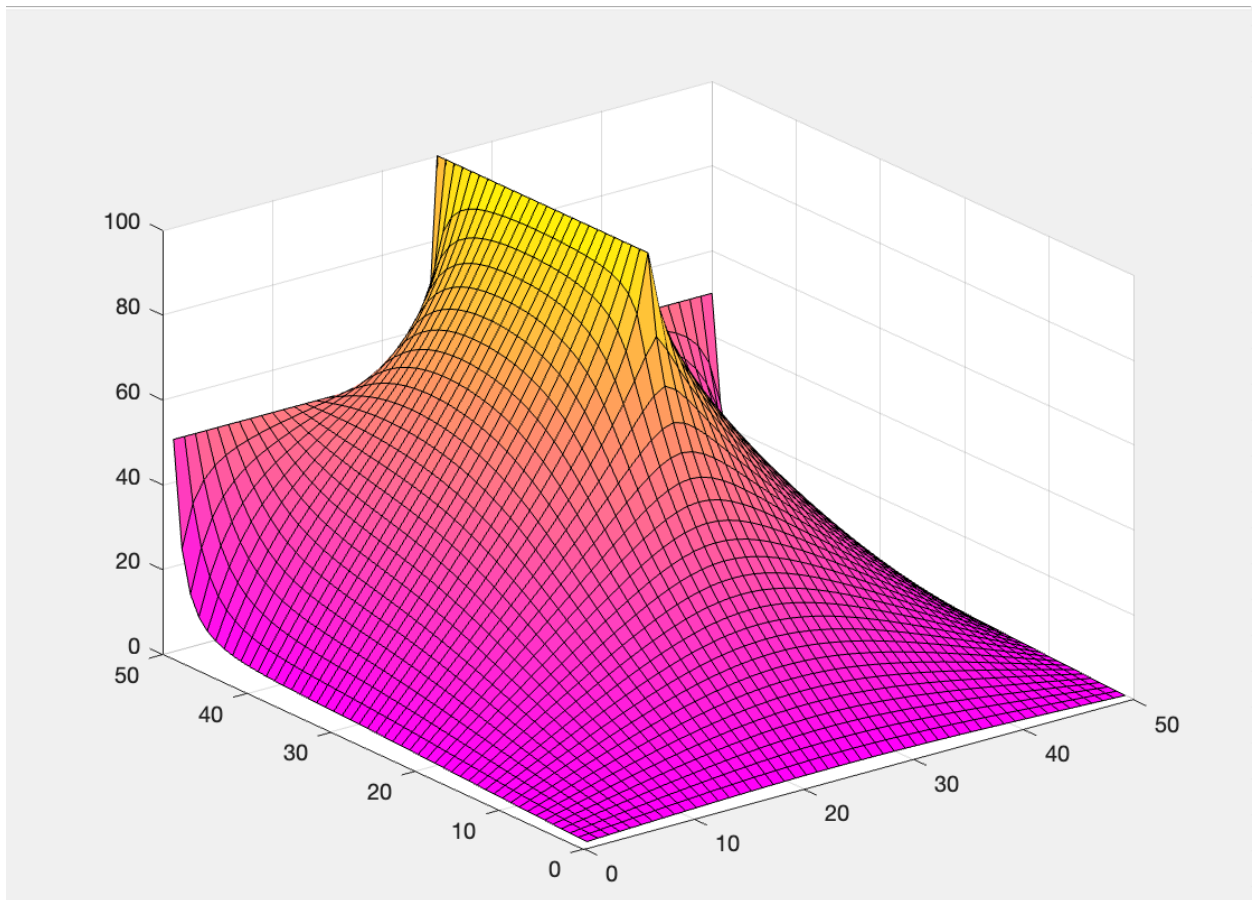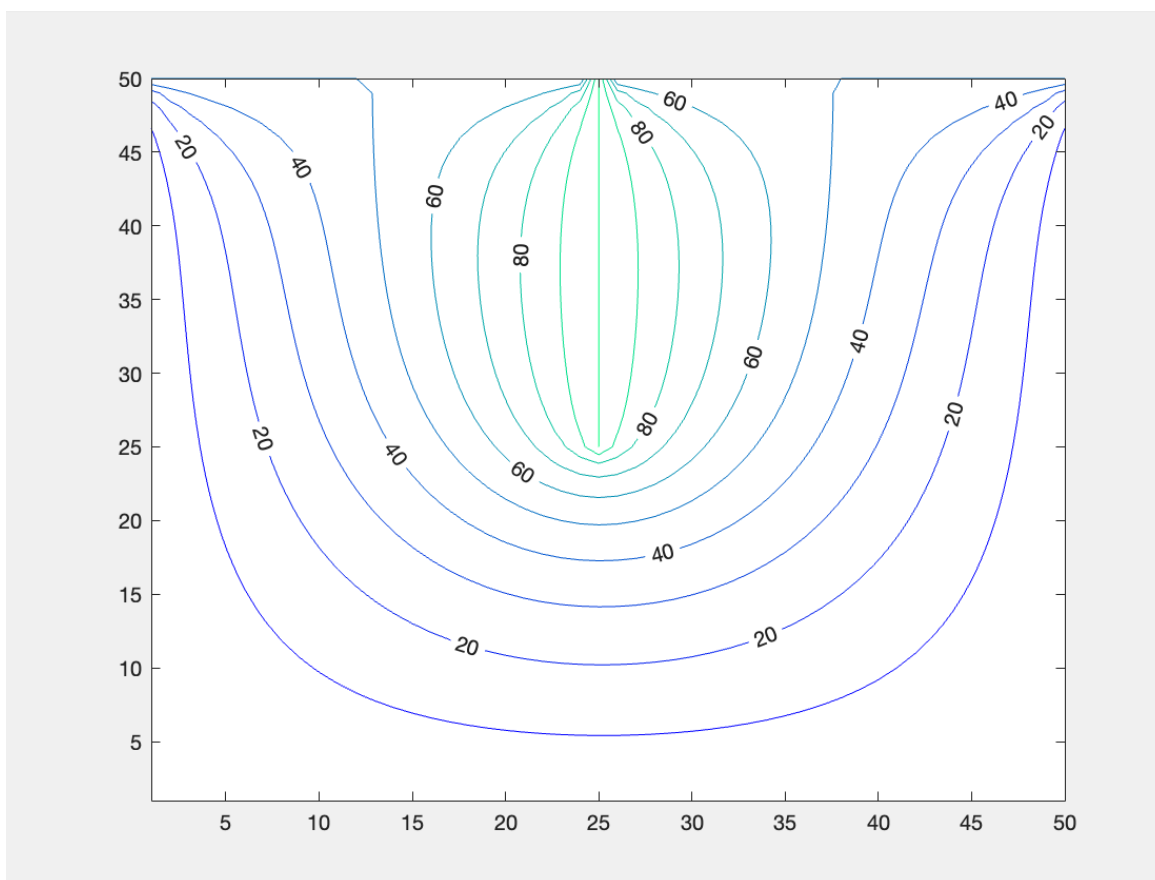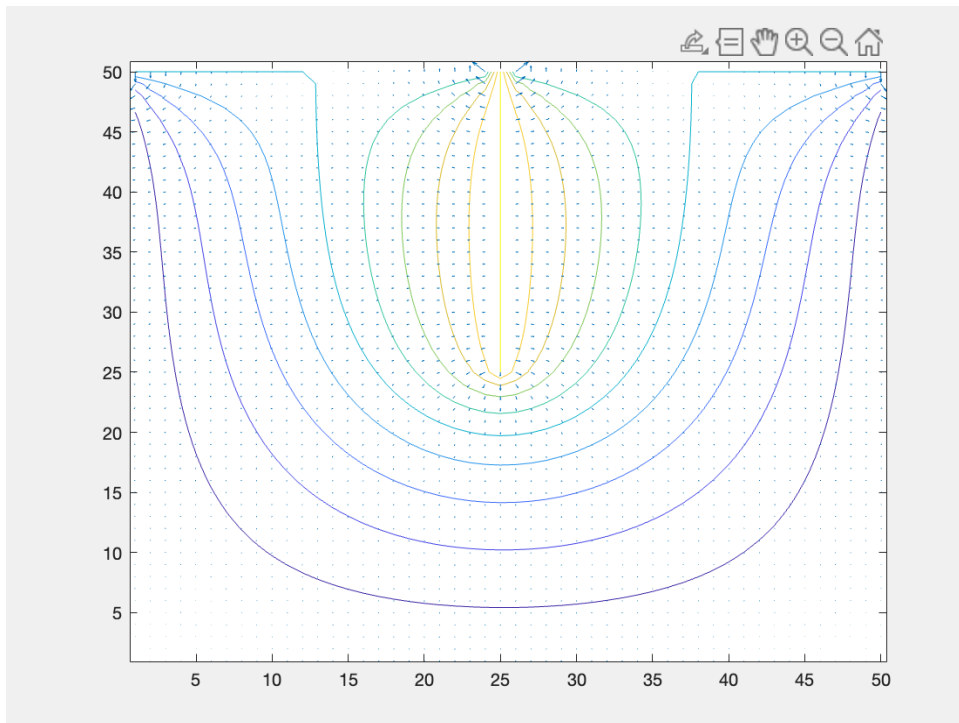**Assignment 6:**
Jenisha Thevarajah
thevaj5

MATLAB GRAPHS:

Matlab Code:

```matlab
%Jenisha Thevarajah
%400473218

VOut=0;
V=100.0;


NumXPoints=50;
NumYPoints=NumXPoints;
NumUnknown=NumXPoints*NumYPoints;

% matrix of coeffeicents
A=zeros(NumUnknown, NumUnknown);
b=zeros(NumUnknown,1);
i_line=(NumXPoints)/2;
j_line=(NumYPoints)/2;

% Equation count
EqCount=1;

% for all rows
for i=1:NumXPoints

    % for all columns
    for j=1:NumYPoints
        if(i==i_line && j>=j_line)
            A(EqCount, EqCount)=1;
            b(EqCount,1)=V;
        elseif(i<i_line) && (j==NumYPoints)
            A(EqCount, EqCount)=1;
            b(EqCount,1)=50;

        elseif(i>i_line) && (j==NumYPoints)
            A(EqCount, EqCount)=1;
            b(EqCount,1)=50;

        else
            A(EqCount, EqCount)=-4;
            if(j==1)
                b(EqCount)=b(EqCount)-VOut;
            else
                A(EqCount,EqCount-1)=1.0;
            end
            if(j==NumYPoints)
                b(EqCount,1)= b(EqCount,1)-50;
            else
                A(EqCount, EqCount+1)=1.0;
            end
            if(i==1)
                b(EqCount,1)=b(EqCount,1)-VOut;
            else
                A(EqCount, EqCount-NumXPoints)=1;
            end
            if(i==NumXPoints)
                b(EqCount,1)=b(EqCount,1)-VOut;
            else
                A(EqCount, EqCount+NumXPoints)=1.0;
            end
        end
        EqCount=EqCount+1;
    end
end
```

```matlab
        end
    end


    V=A\b; %obtain the vector of voltages
    VSquare = reshape(V, NumXPoints, NumYPoints);%convert values into a rectangular matrix
    ax1 = nexttile;
    surf(VSquare);
    colormap(ax1,spring);
    figure;
    [C,h] = contour(VSquare);
    set(h,'ShowText','on','TextStep',get(h,'LevelStep')*2)
    colormap winter;
    figure;
    contour(VSquare);
    [px,py] = gradient(VSquare);
    hold on, quiver(-px,-py), hold off %obtain the electric field map by using E=-Gradient(V)
```