MECH 6V29 - HW 4

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```
clear
clc
close all
```

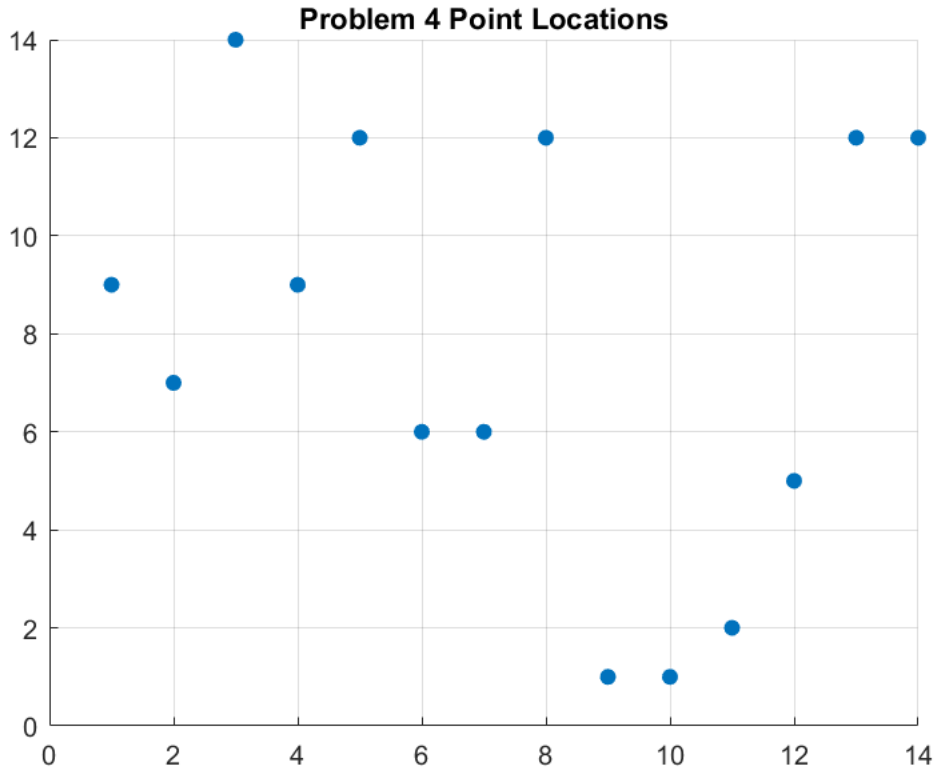
Problem 4

Draw a Gabriel graph induced by the following set of 14 points.

```
P = [
    1 2 3 4 5 6 7 8 9 10 11 12 13 14
    9 7 14 9 12 6 6 12 1 1 2 5 12 12
    ];
X = P(1,:)';
Y = P(2,:)';
```

Plot Point Locations

```
figure();
scatter(X, Y, 'filled')
title('Problem 4 Point Locations')
grid on
saveas(gcf, '.\fig\pblm4_points.png')
```




```
V = num2cell([X Y],2)
```

V = 14×1 cell

	1
1	[1,9]
2	[2,7]
3	[3,14]
4	[4,9]
5	[5,12]
6	[6,6]
7	[7,6]
8	[8,12]
9	[9,1]
10	[10,1]
11	[11,2]
12	[12,5]
13	[13,12]
14	[14,12]

Determine Gabriel Graph

```
idx_edge = 1;
tol_gabriel = 0.01;
for i = 1:size(V,1)
    for j = 1:size(V,1)
```

Generate Midpoints

```
        M{i,j}(1) = (X(i) + X(j))/2;
        M{i,j}(2) = (Y(i) + Y(j))/2;
        M_dist{i,j} = norm(M{i,j} - V{i});
```

Determine Edges

```
        if i ~= j
            for k = 1: size(V,1)
                if k == i || k == j
                    in_circle(i,j,k) = 0;
                else
                    in_circle(i,j,k) = norm(M{i,j} - V{k}) < M_dist{i,j} + tol_gabriel;
                end
            end
            if any(in_circle(i,j,:) == 1,'all')
                continue
            else
                E{idx_edge} = [i, j];
                idx_edge = idx_edge + 1;
                continue
            end
        end
    end
end
```

Gabriel Graph Edges

```
E = E'
```

E = 40×1 cell

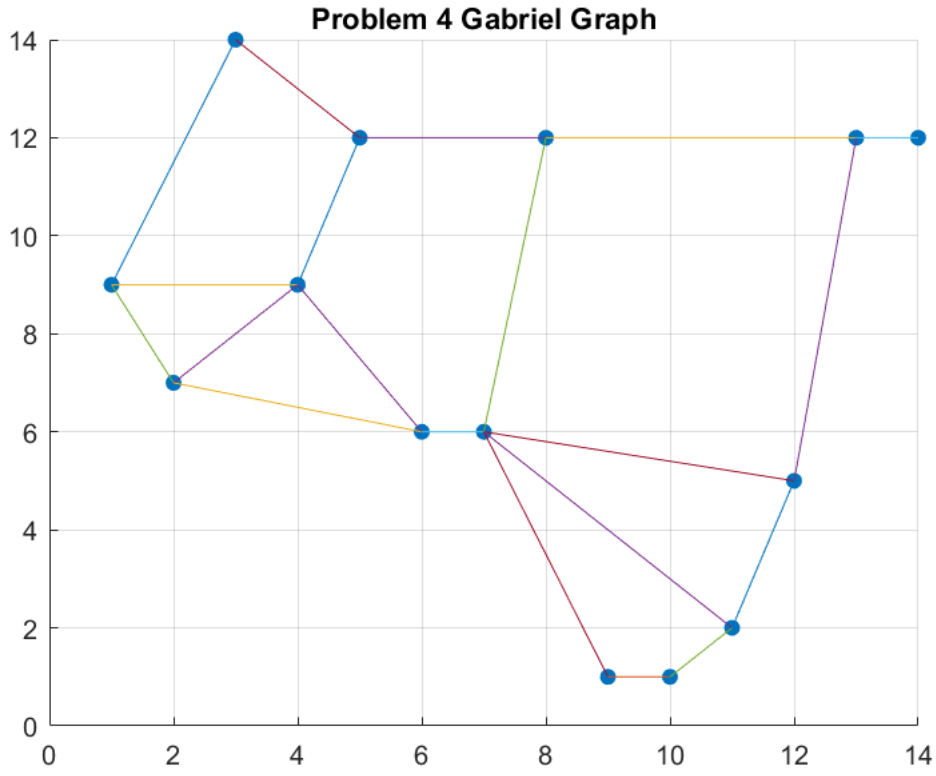
	1
1	[1,2]
2	[1,3]
3	[1,4]
4	[2,1]
5	[2,4]
6	[2,6]
7	[3,1]
8	[3,5]

	1
9	[4,1]
10	[4,2]
11	[4,5]
12	[4,6]
13	[5,3]
14	[5,4]

⋮

Plot Graph

```
fig_pblm4_resutls = plot_graph(V, E);
saveas(fig_pblm4_resutls, '.\fig\pblm4_results.png')
```



Export to PDF automatically

```
export("MECH6V29_HW04")
```