Part 1 k medians

The lines that were changed from k means were the distance calculations that was changed to cityblock

```
distance = pdist2(X, centres,"cityblock");
```

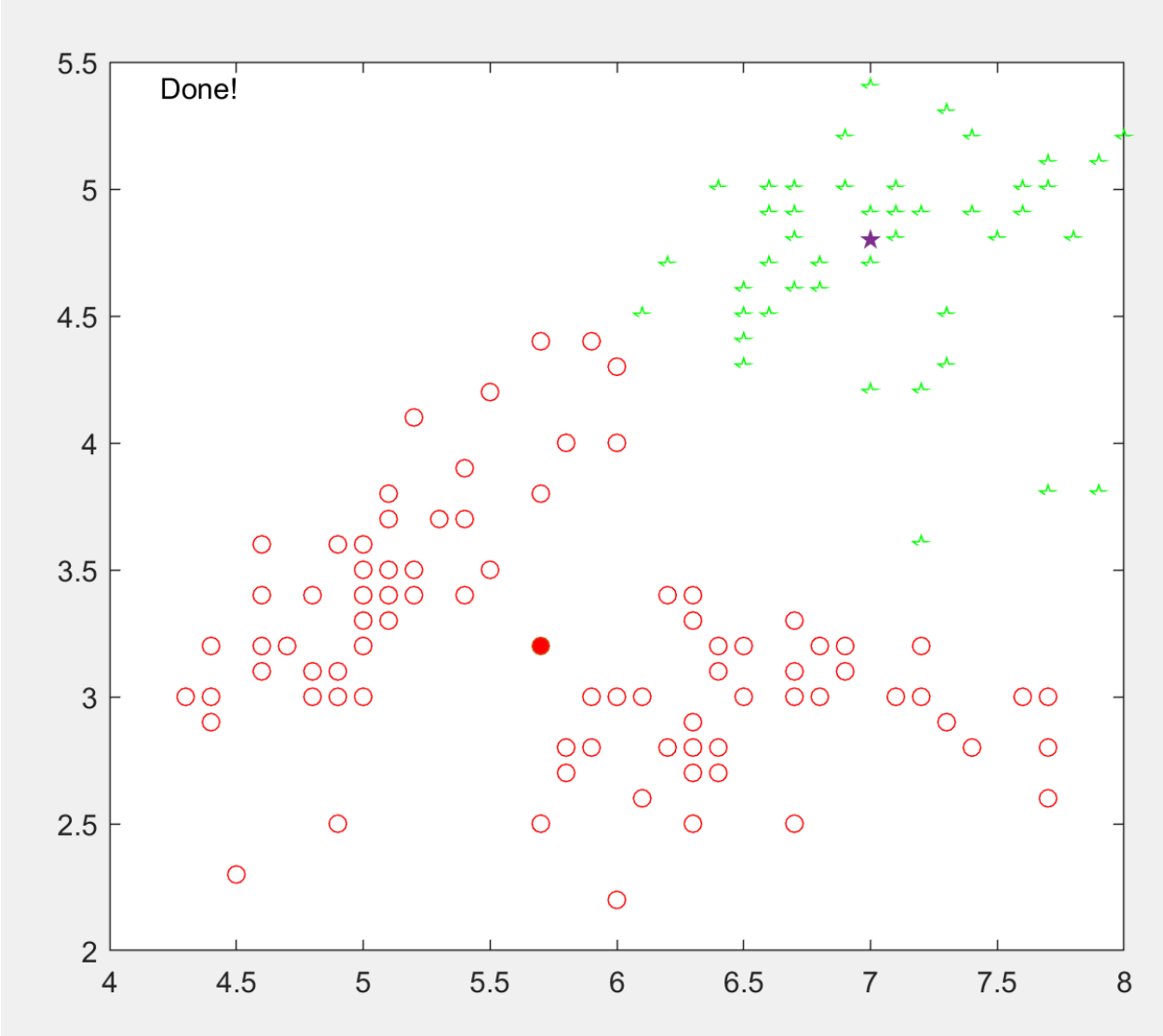
And the update cluster centers by using median instead of mean

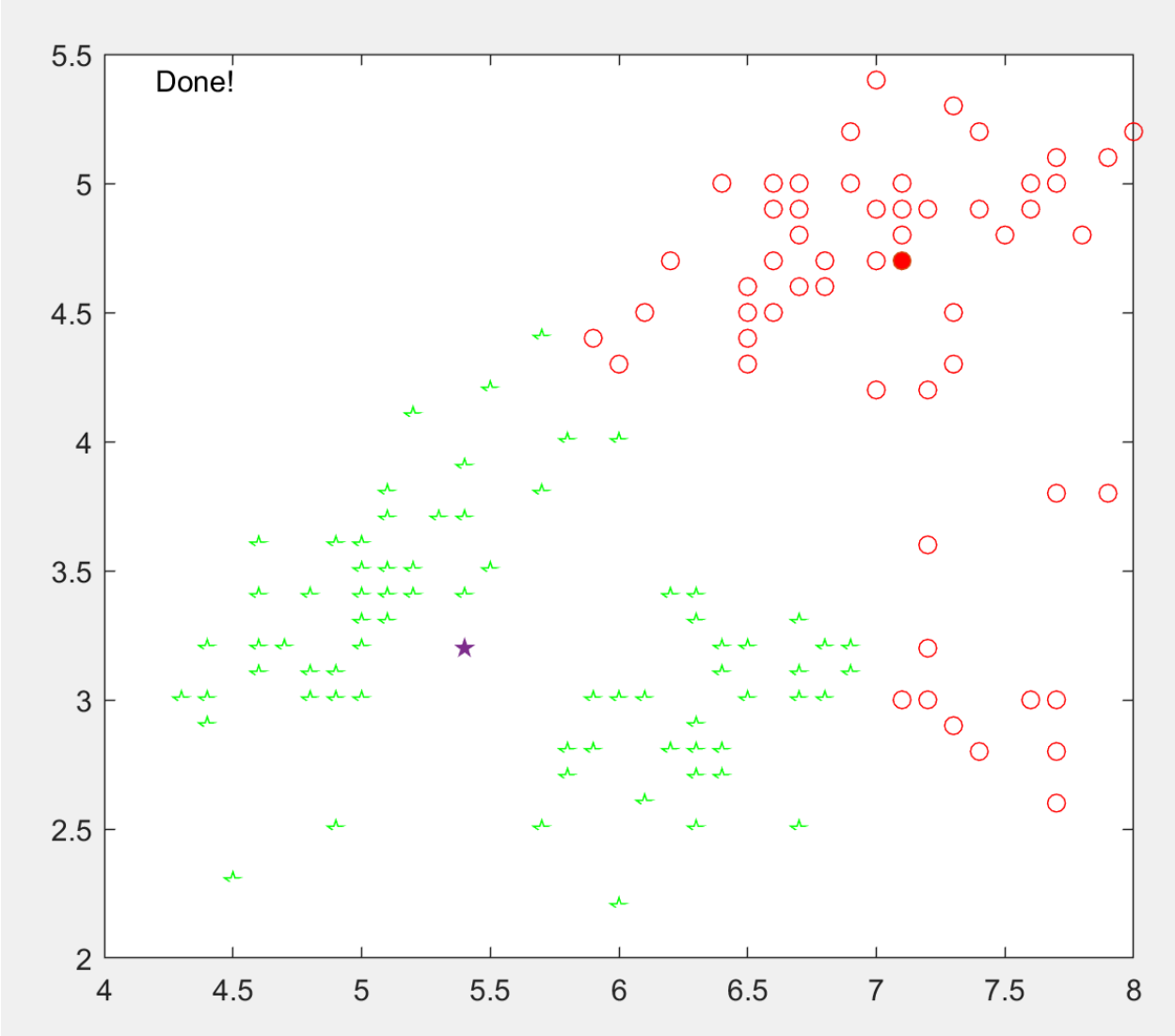
```
% M step: Update cluster centres based on the new assignment.
for j = 1:n_cluster
    centres(j, :) = median(X(membership == j, :));
end
```

Can also add code to handle empty clusters

```
% M step: Update cluster centres based on the new assignment.
for j = 1:n_cluster
    %check if cluster is empty
    if isempty(X(membership == j, :))
        centres(j, :) = X(randi(n_sample), :);
    else
        centres(j, :) = median(X(membership == j, :));
    end
end
```

2 clusters

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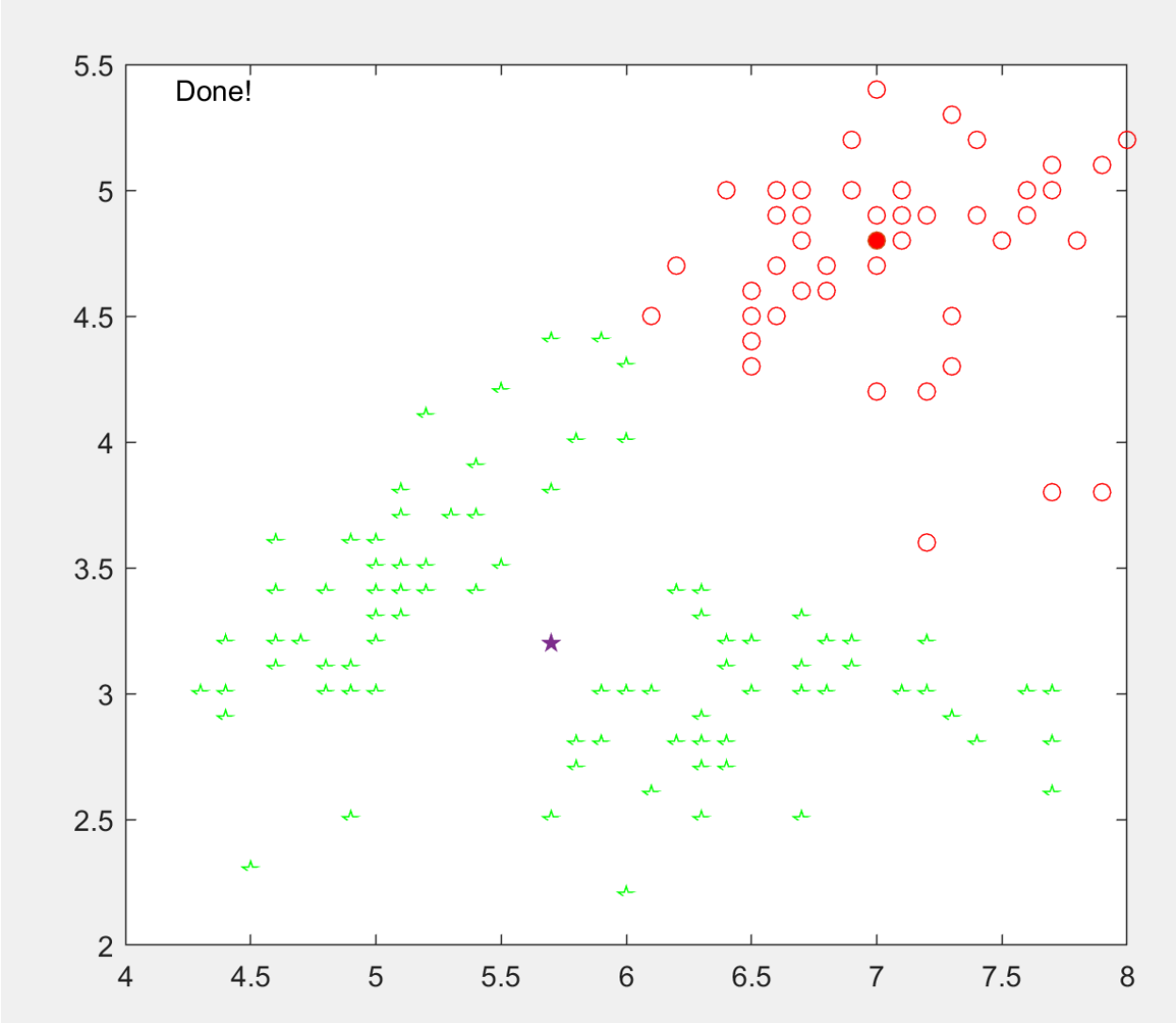
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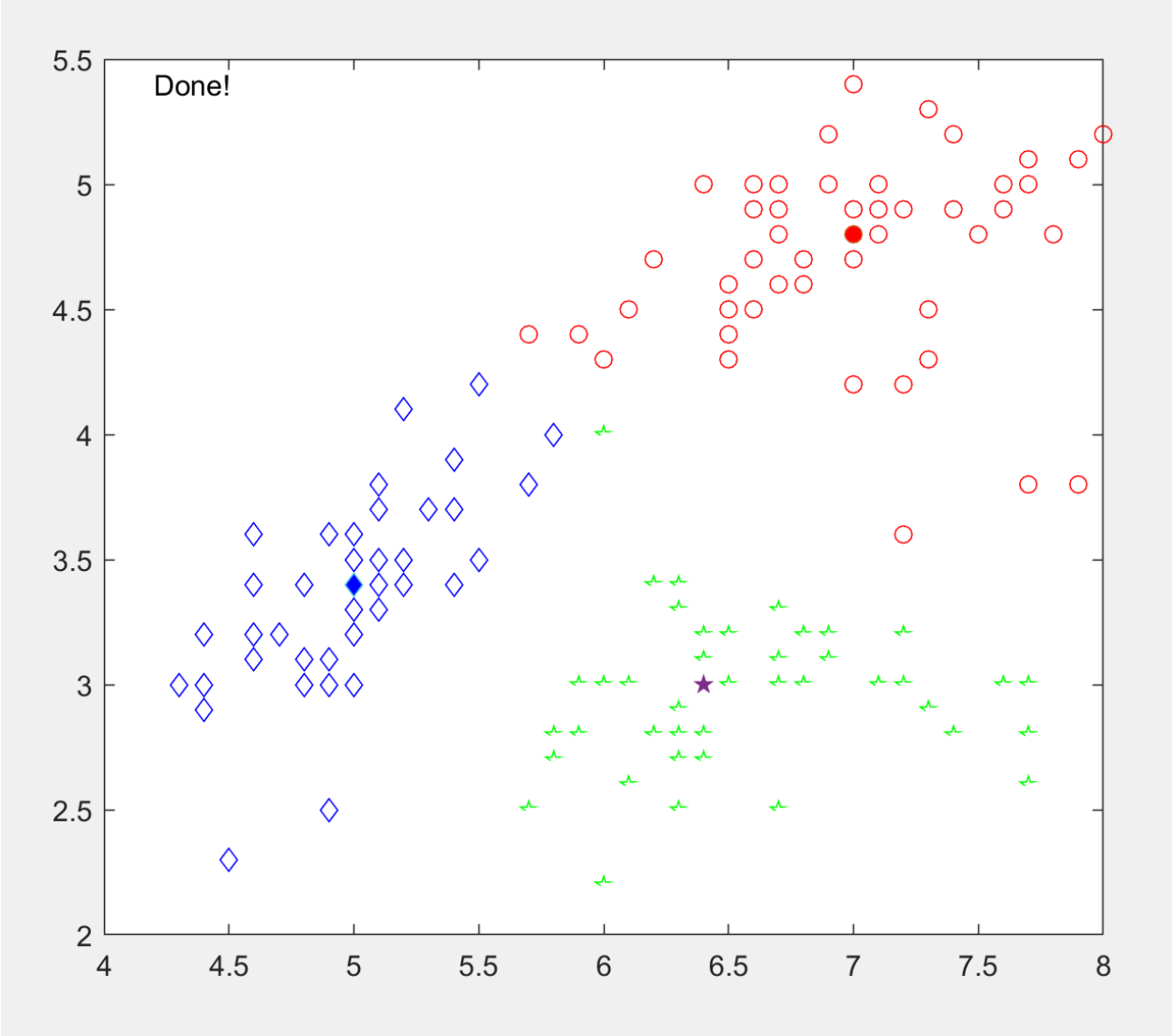
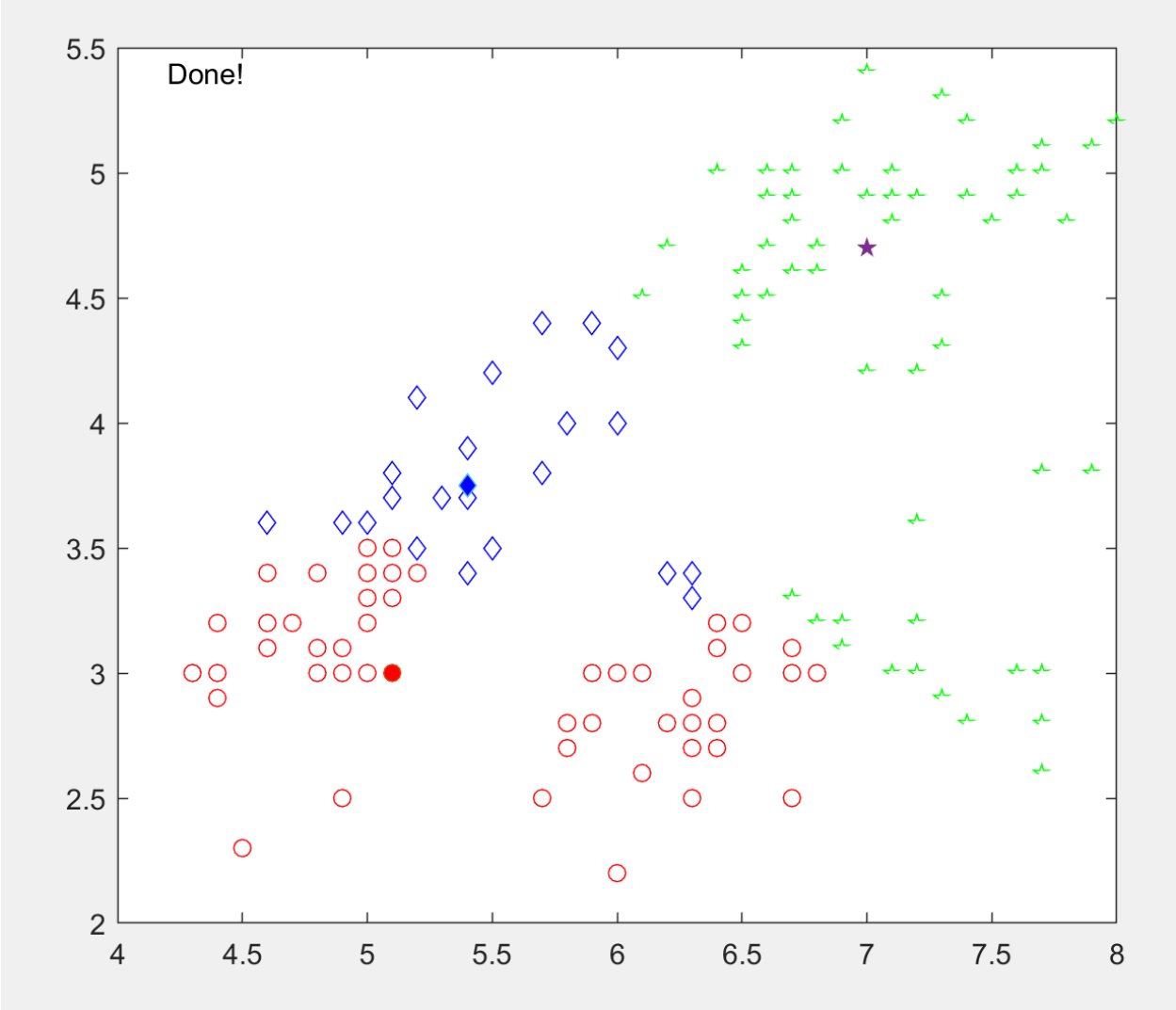
3 clusters

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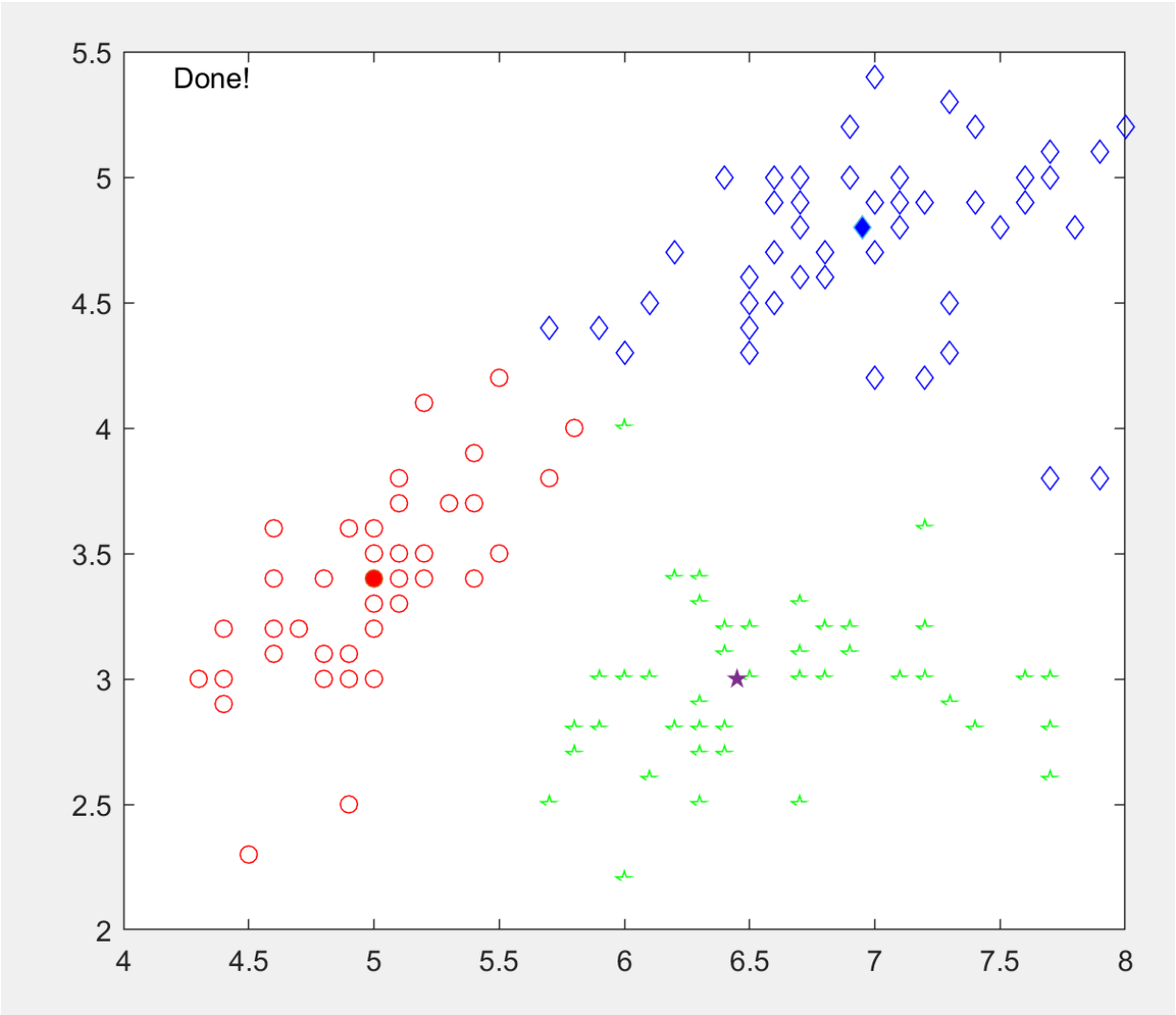
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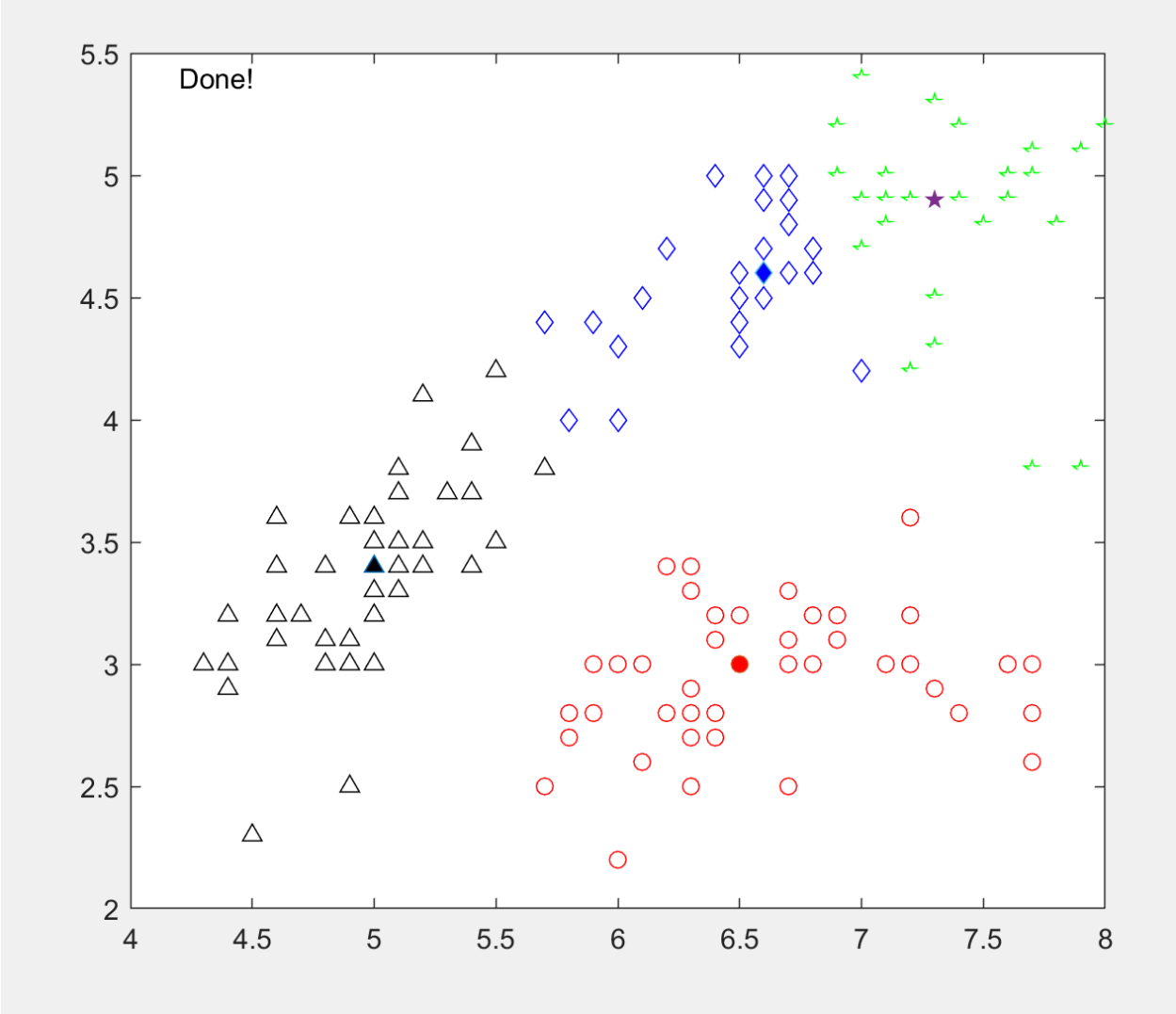
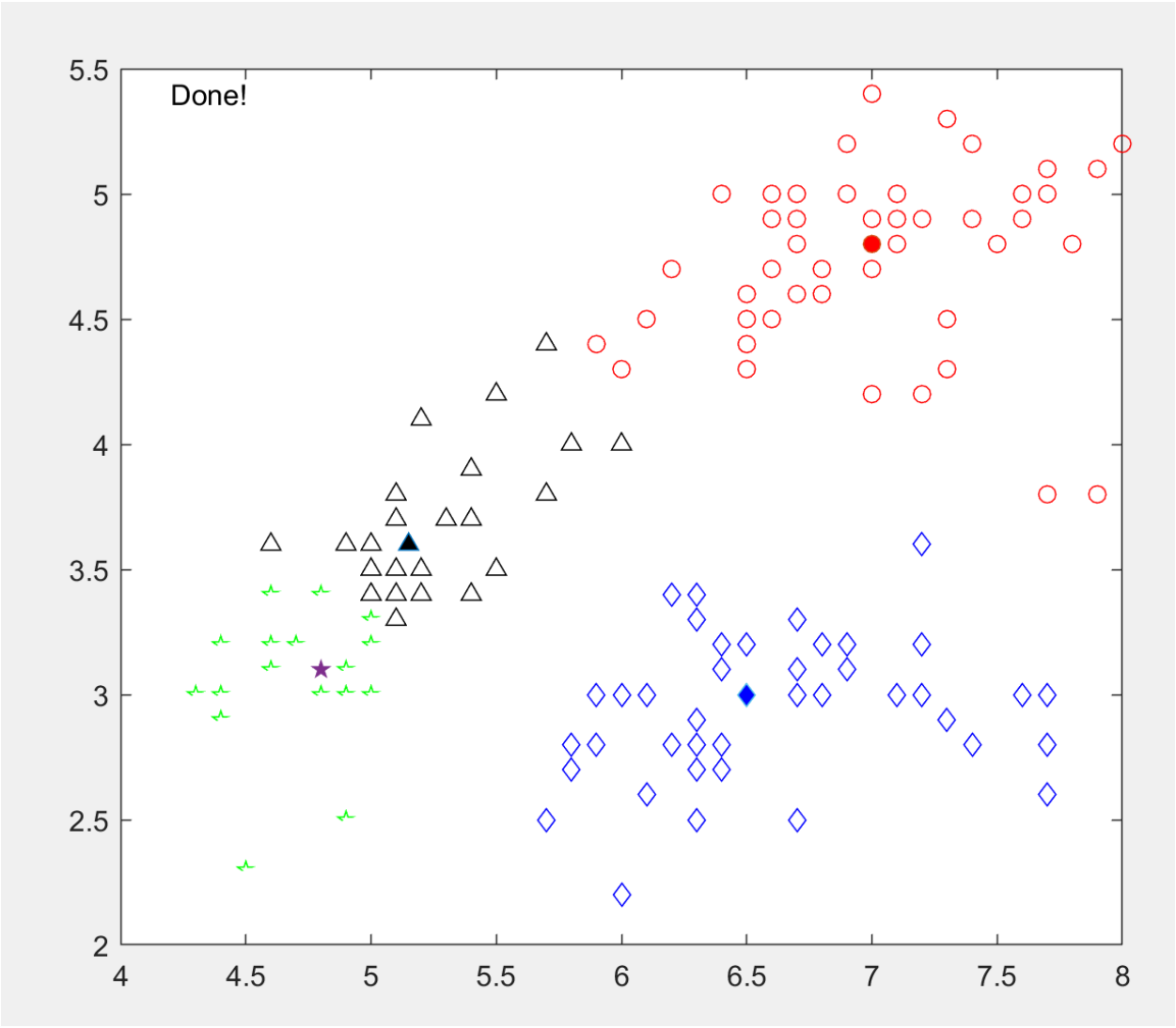
4 clusters

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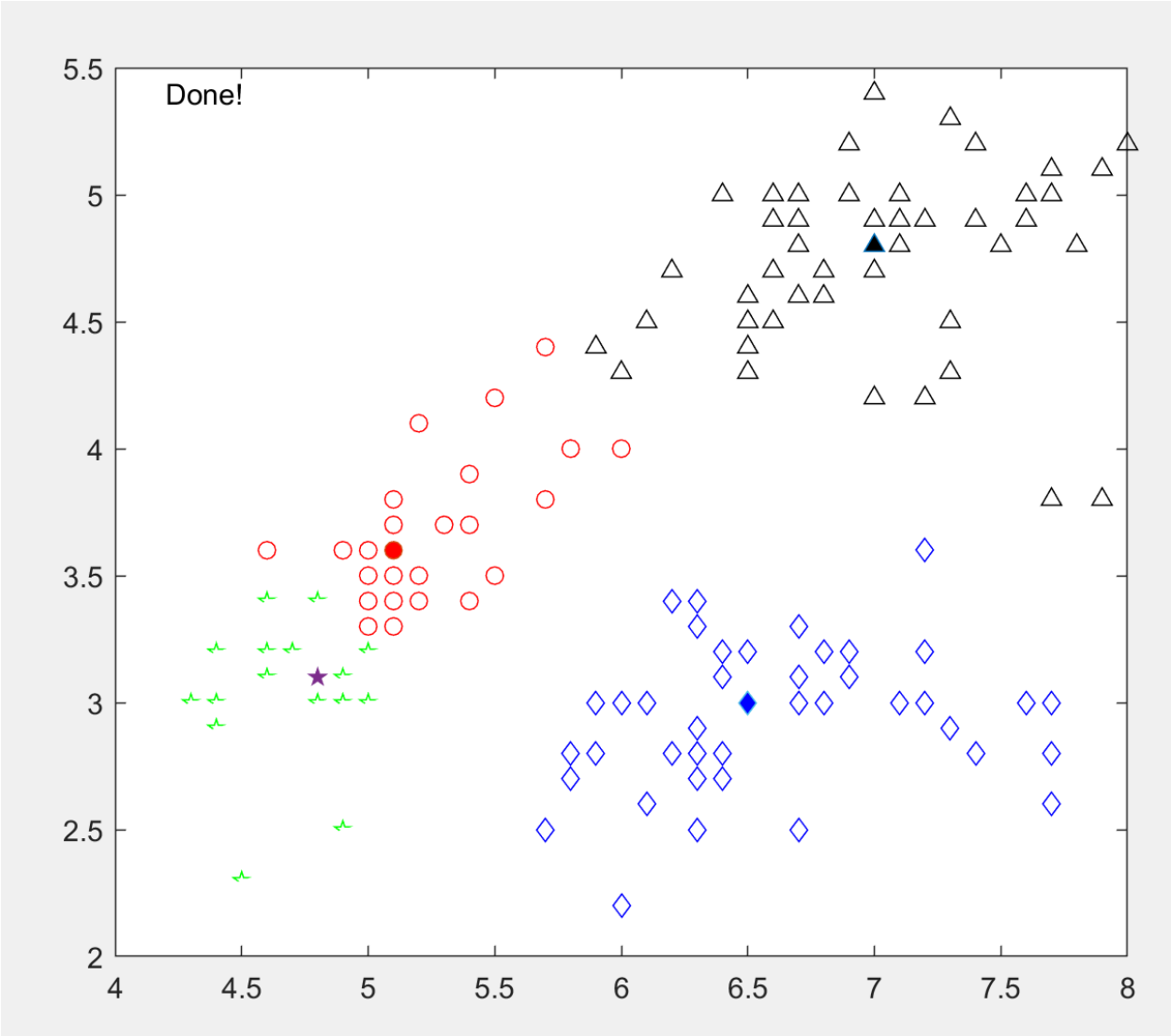


Part 2 k medoids

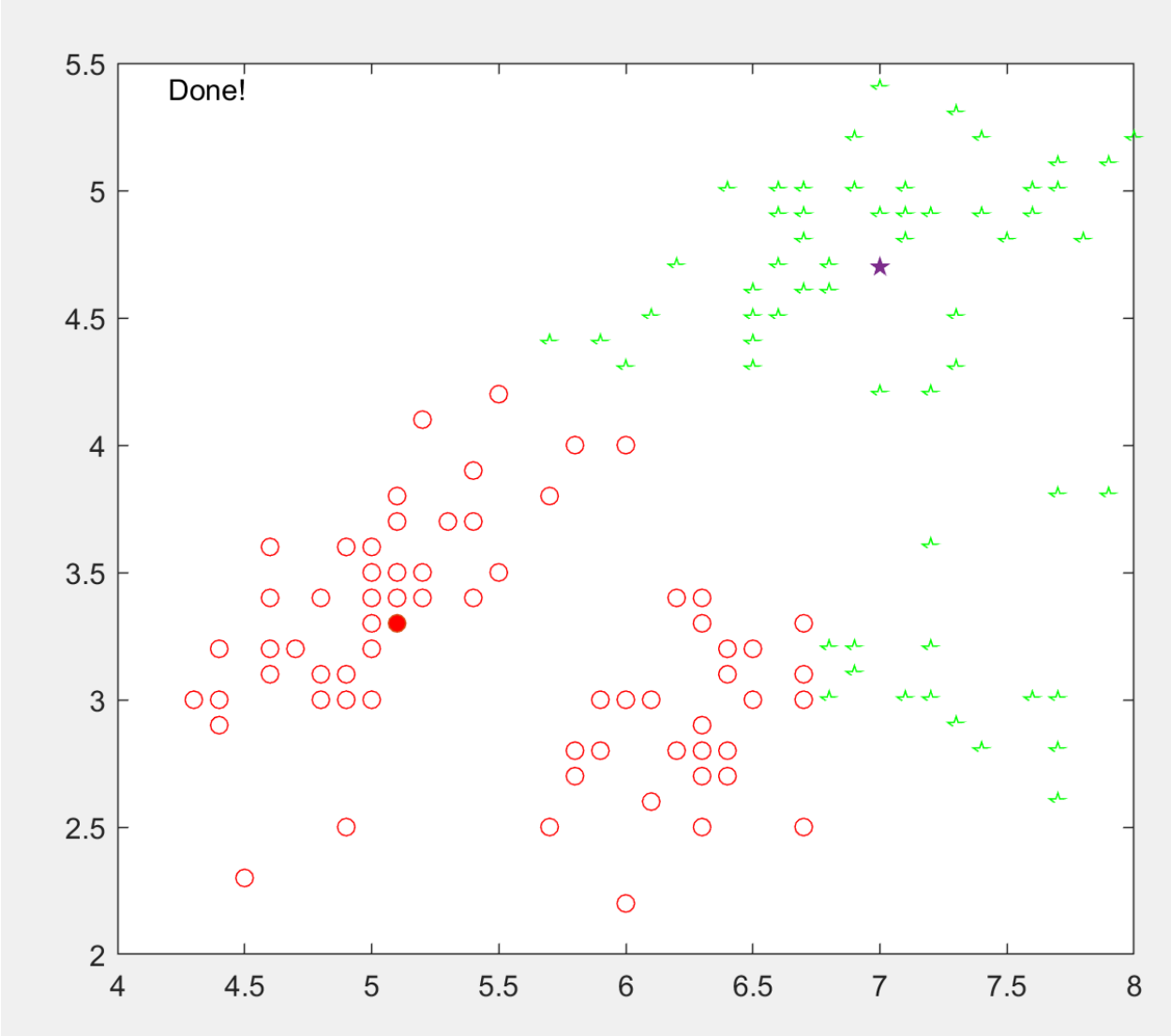
The lines that were changed from k means were the distance calculations that was changed to cityblock

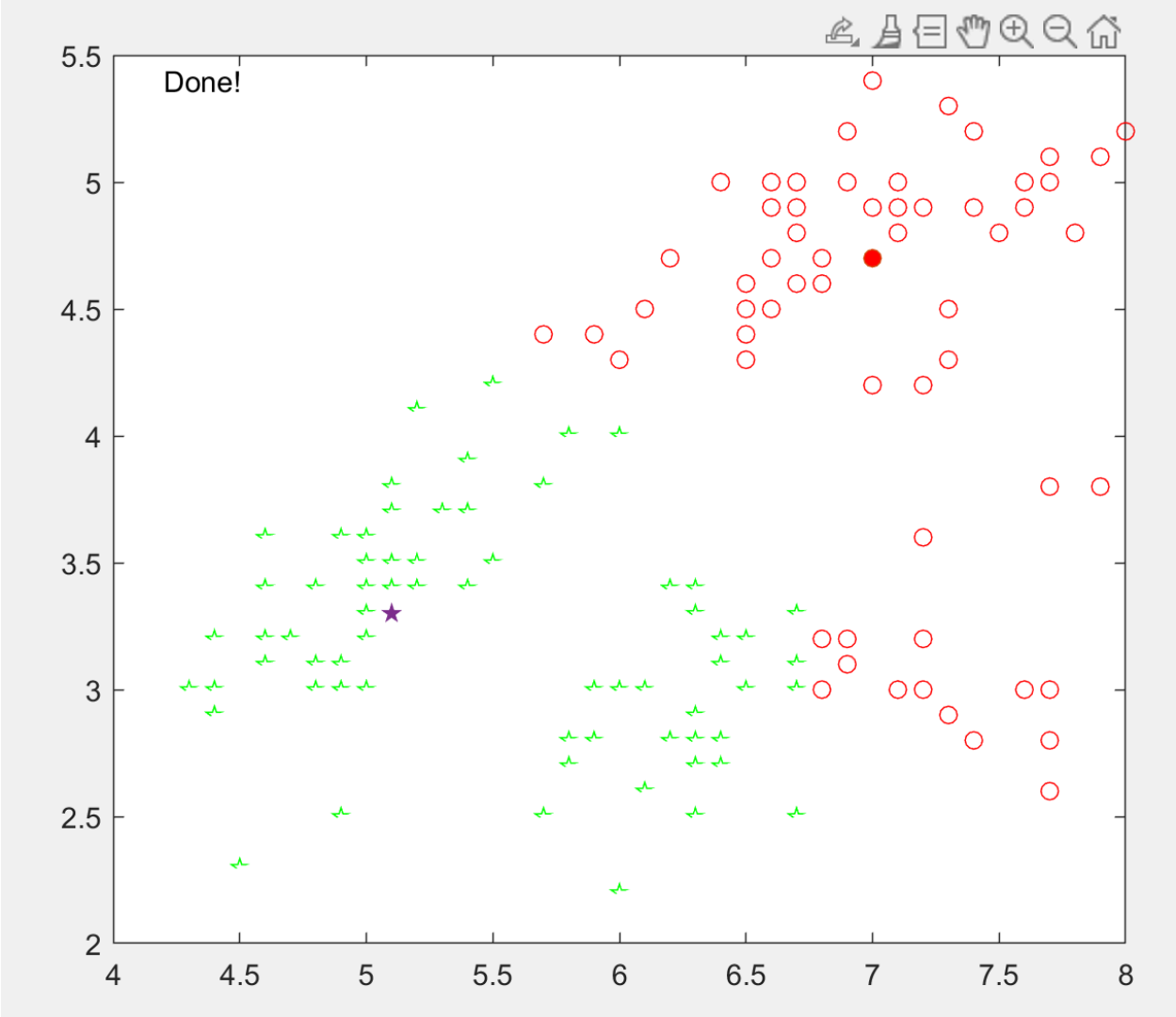
```
distance = pdist2(X, centres,"cityblock");
```

And the update cluster centers

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% M step: Update mediods
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
for j = 1:n_cluster
     cluster_points = X(membership == j, :);
     num_points = size(cluster_points, 1);
     %check empty clusters
     if isempty(cluster_points)
        centres(j, :) = X(randi(n_sample), :);
     else
         mindist = Inf;
         for i = 1:num_points
             %find the sum of distances between that point and all
             %other points
             distance_sum = sum(pdist2(cluster_points(i, :), cluster_points, 'cityblock'));
             %update medoid
             if distance_sum < mindist
                 mindist = distance_sum;
                 centres(j, :) = cluster_points(i, :);
             end
         end
     end
end
```

2 clusters

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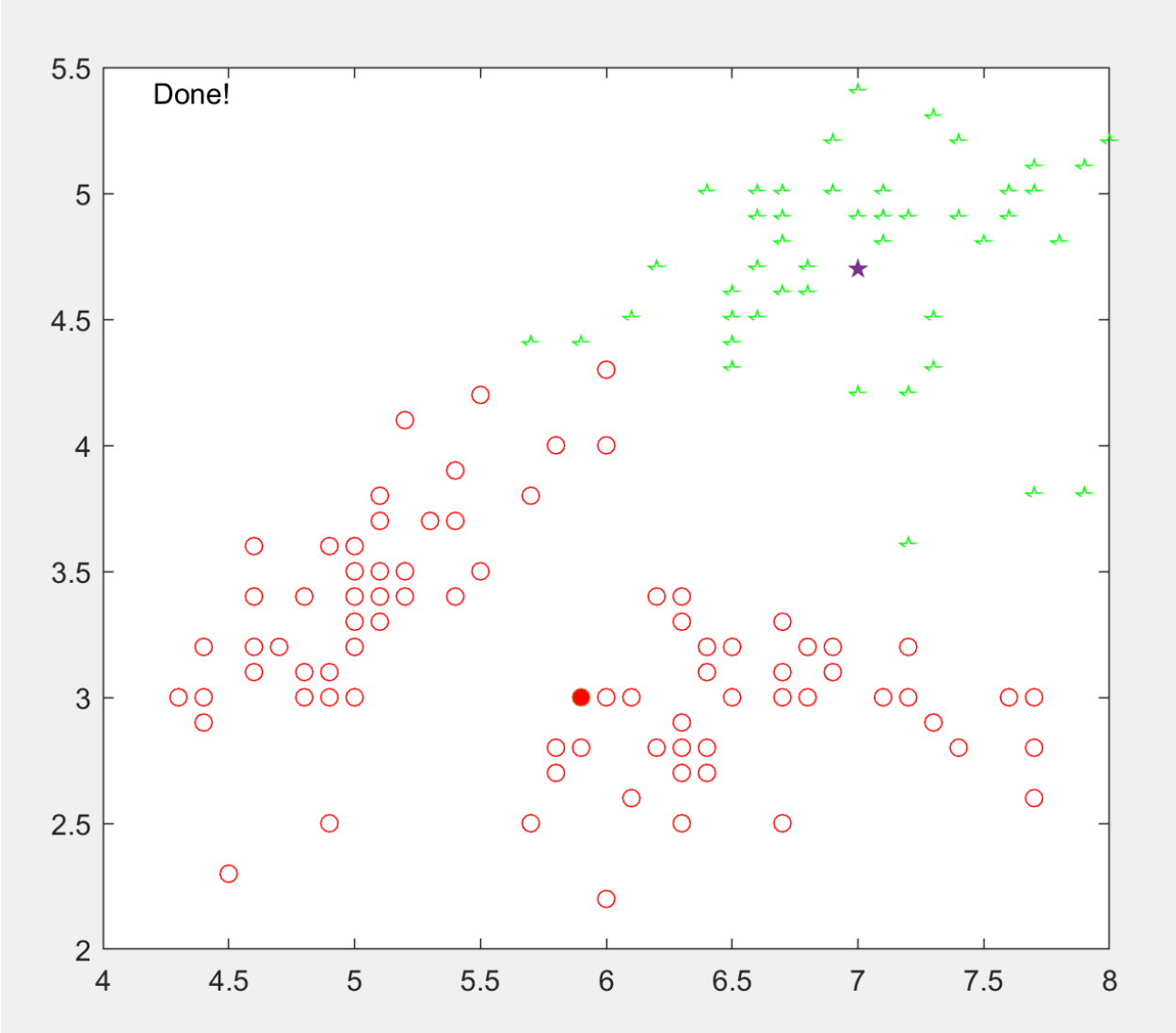
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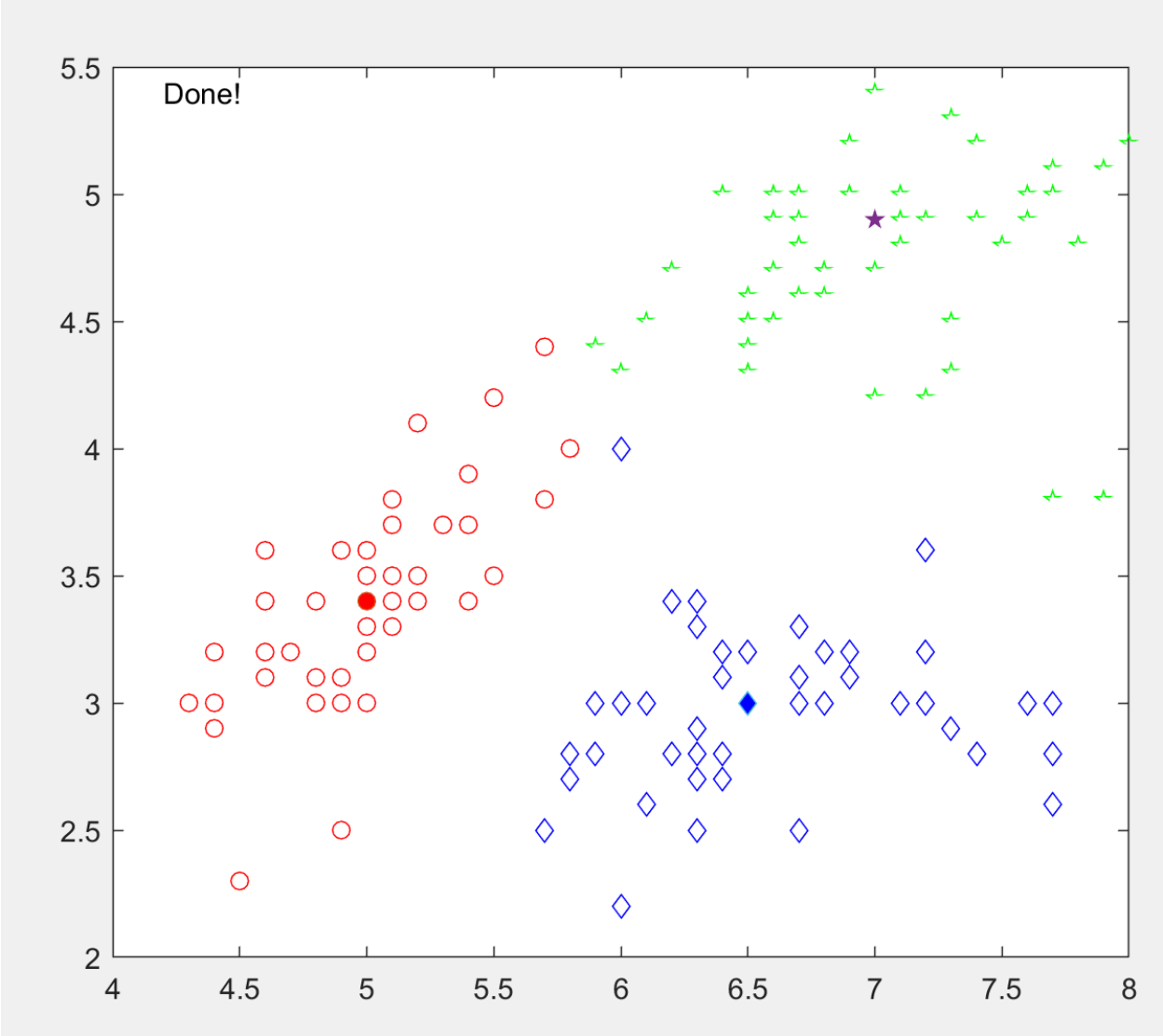
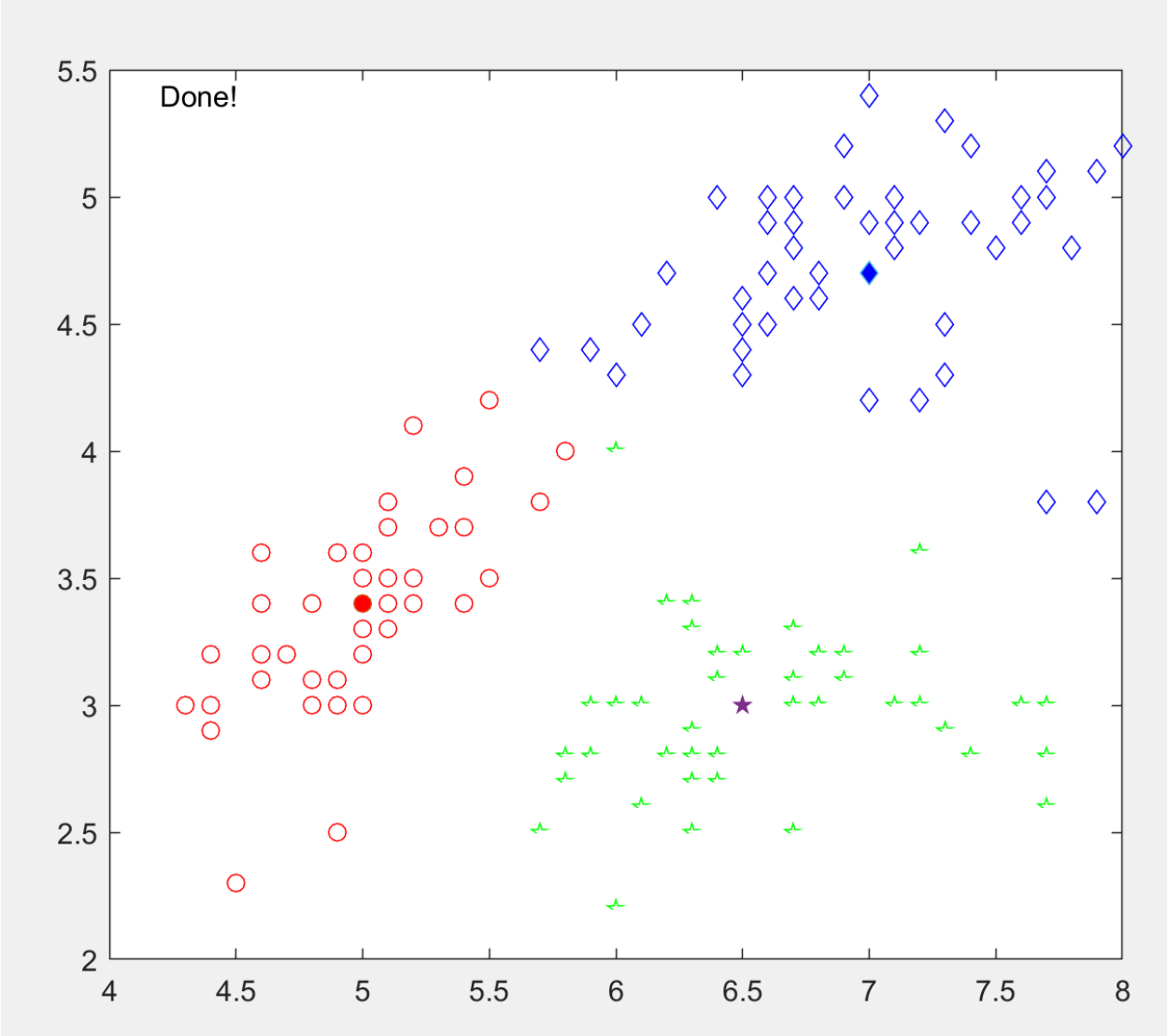
3 clusters

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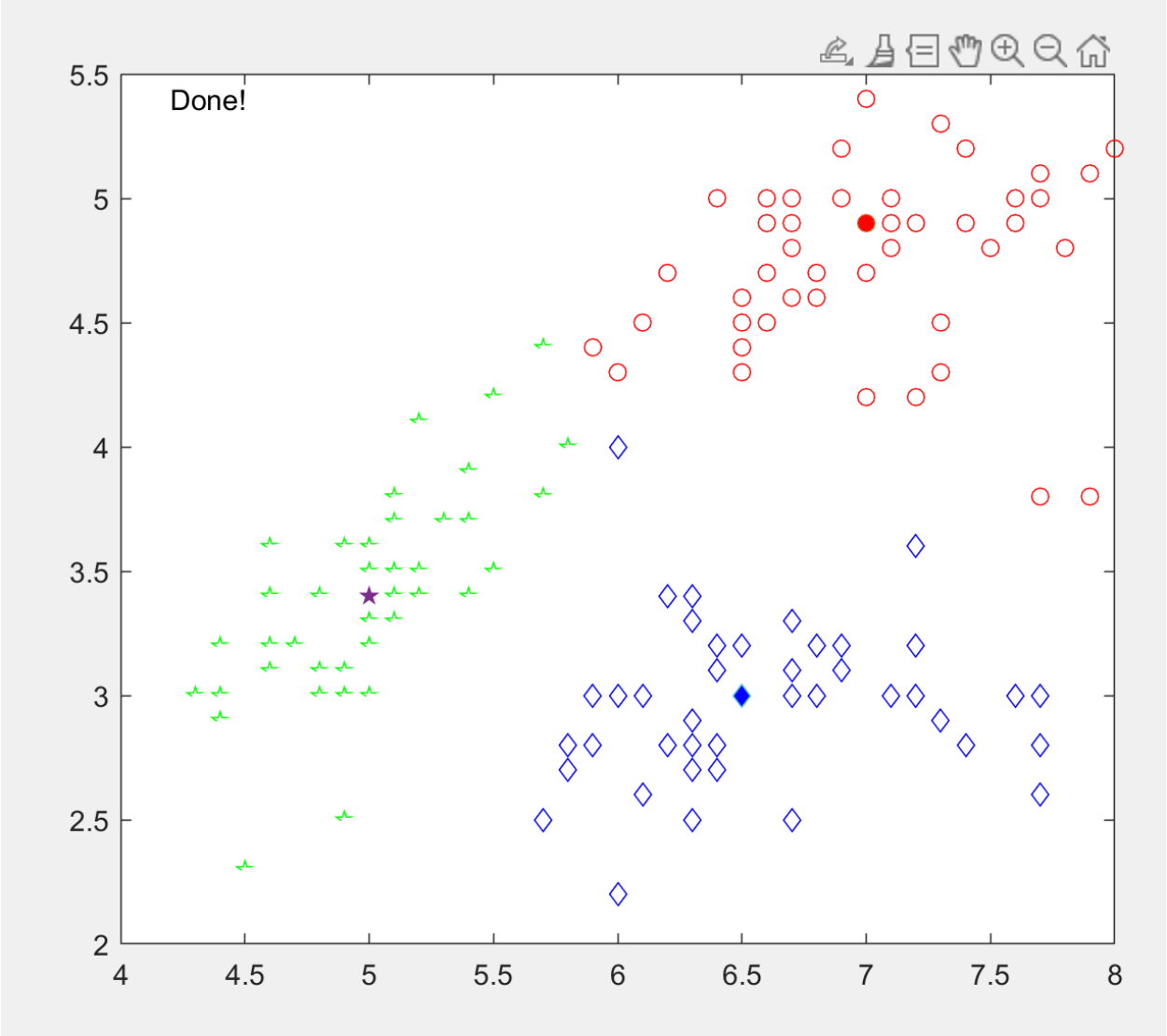
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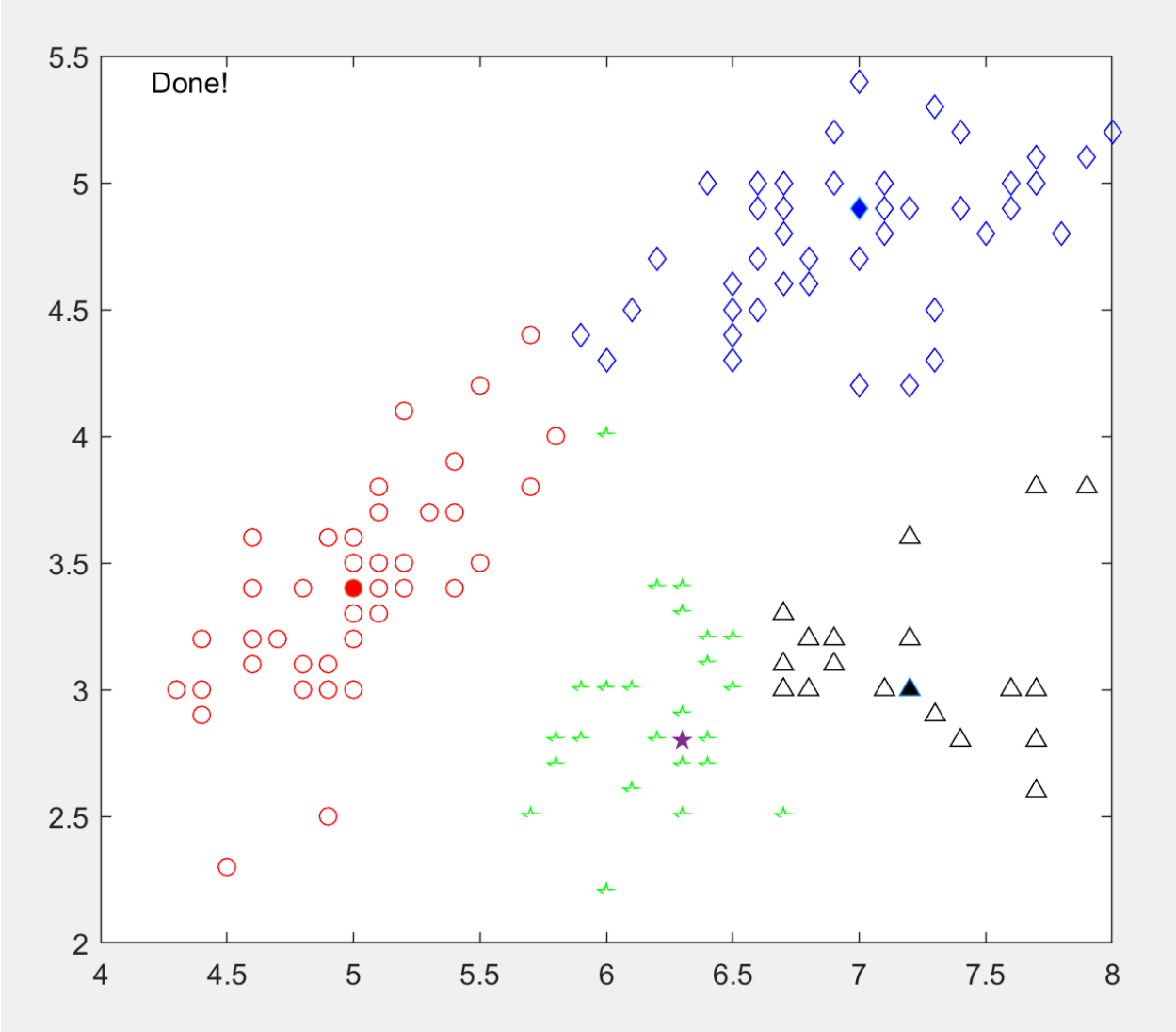
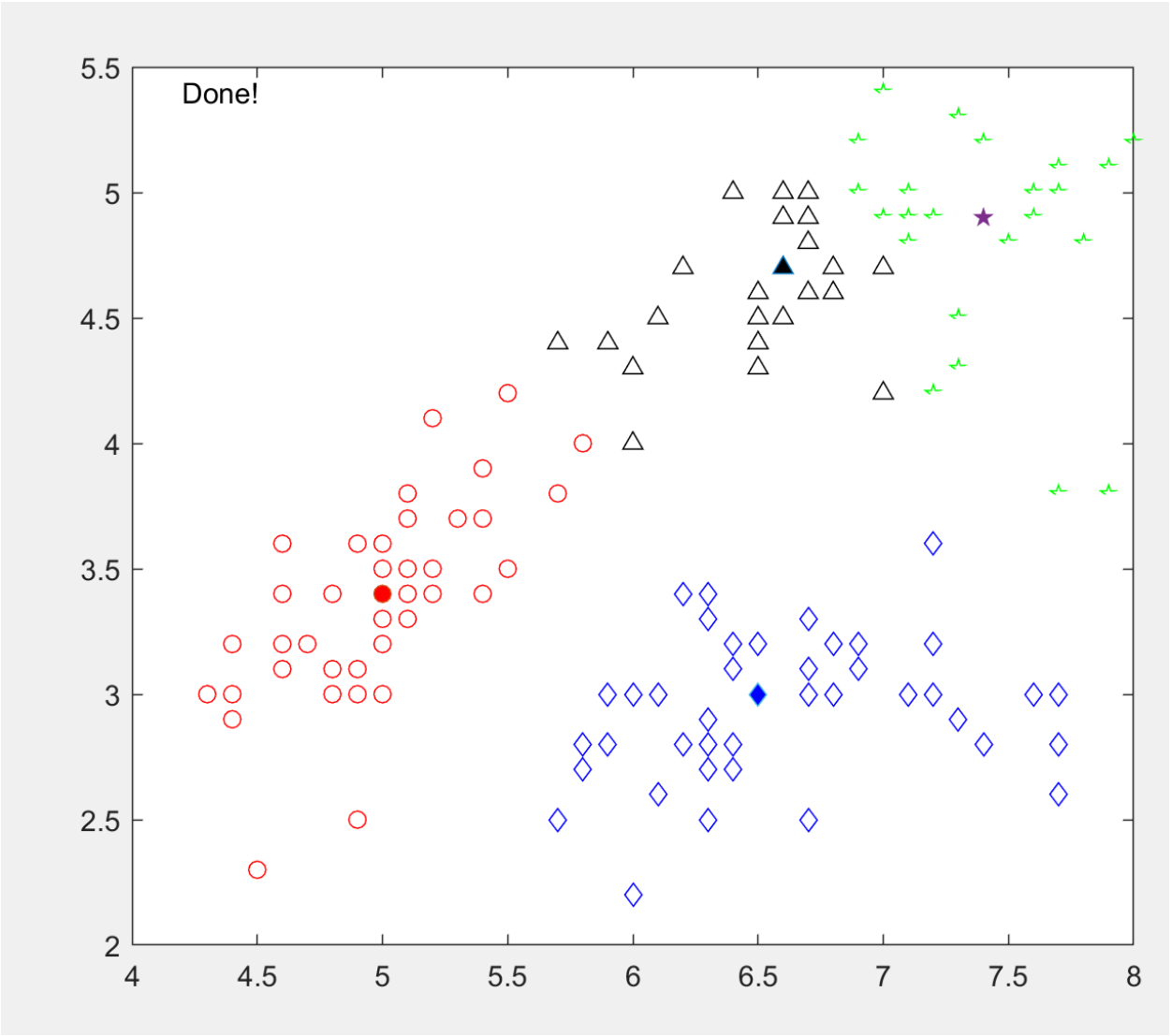
4 clusters

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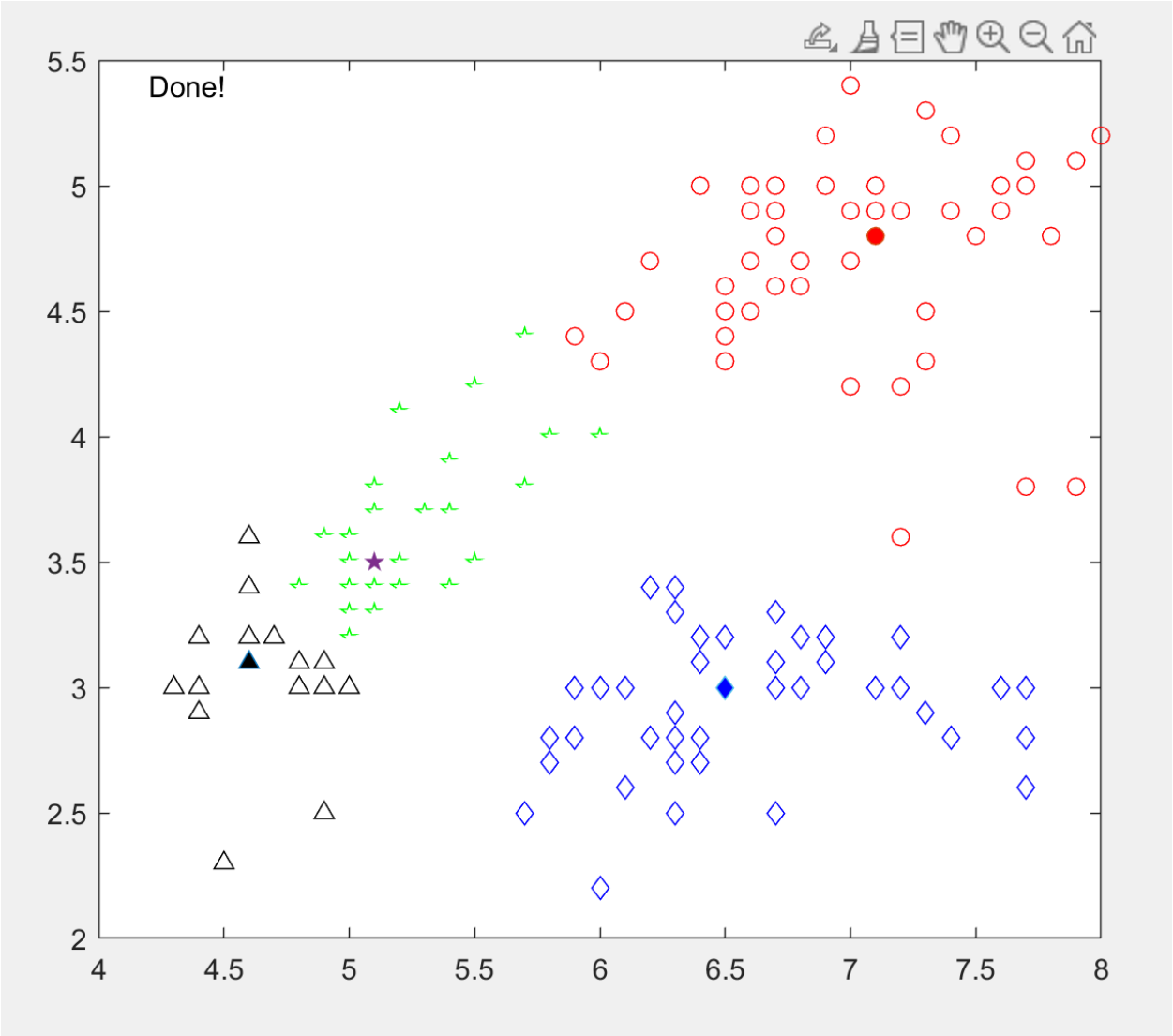
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