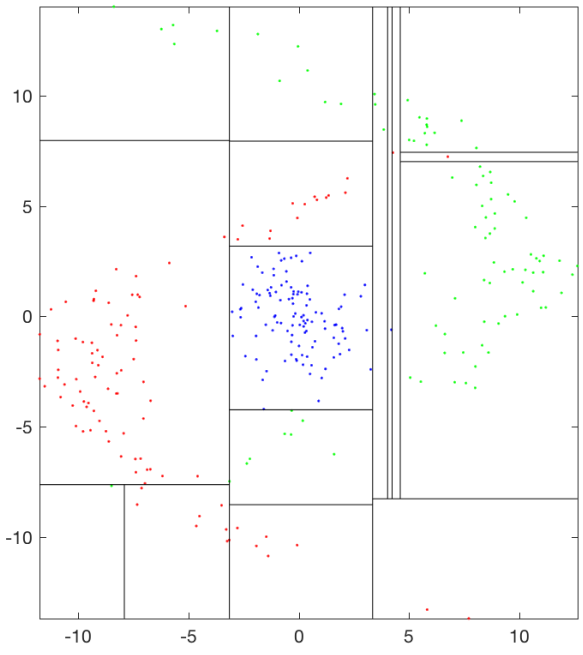
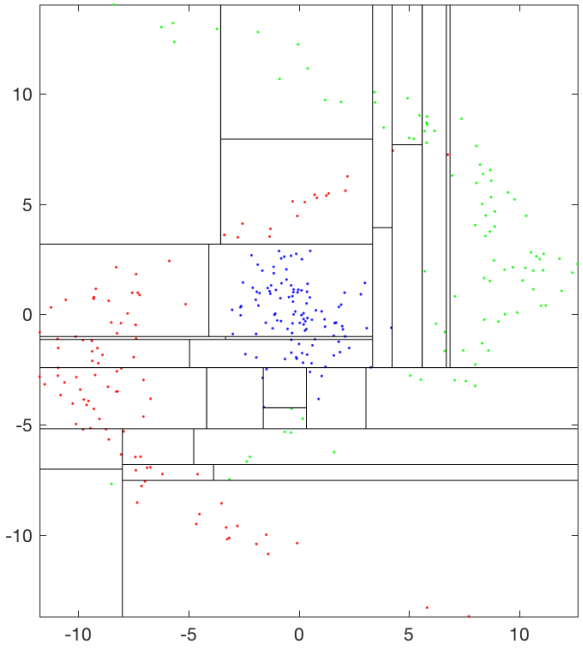


(a) Optimal dimension split



(b) Random dimension split

Figure 2: Decision trees

Problem (f)

```
% Define parameters
maxDepth = 20;
depths = 1:maxDepth;
errs = zeros(maxDepth, 1);

% Compute errors
for d = depths
    tau = trainTree(T, 0, false, d);
    errs(d) = err(@(x) treeClassify(x, tau), V);
end

% Plot
plot(depths, errs);
title('Validation Error Rate vs. Max Depth');
xlabel('Max Depth');
ylabel('Validation Error Rate');
% saveas(gcf, 'tex/graphics/2f-validation.png');

% Min error
[em, im] = min(errs);
fprintf('Min: (%d, %f)\n', depths(im), em);
```

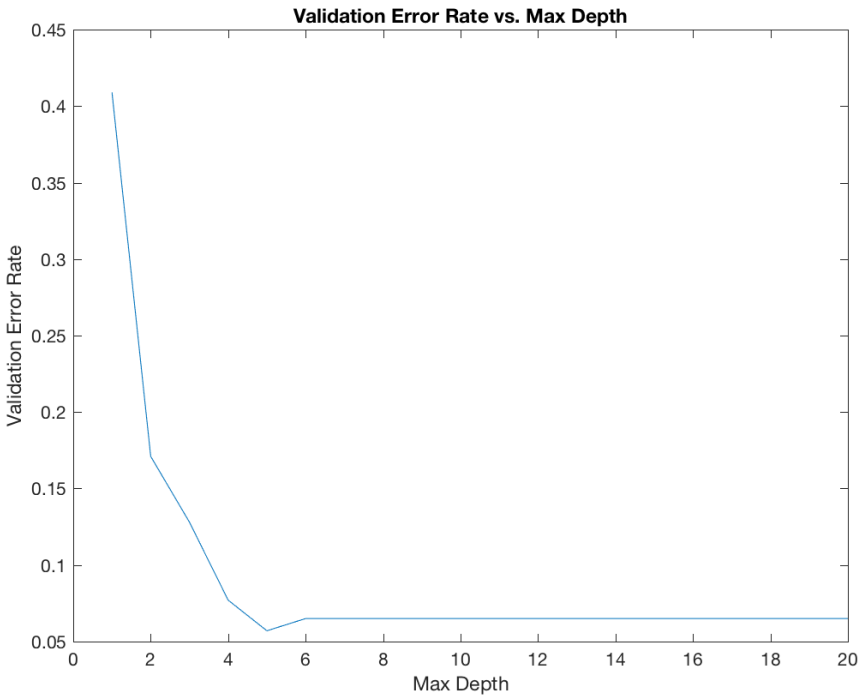


Figure 3: Validation error rate against maximum decision tree depth

As shown, the minimum error rate of 0.057 occurred at depth 5.

Problem (d)

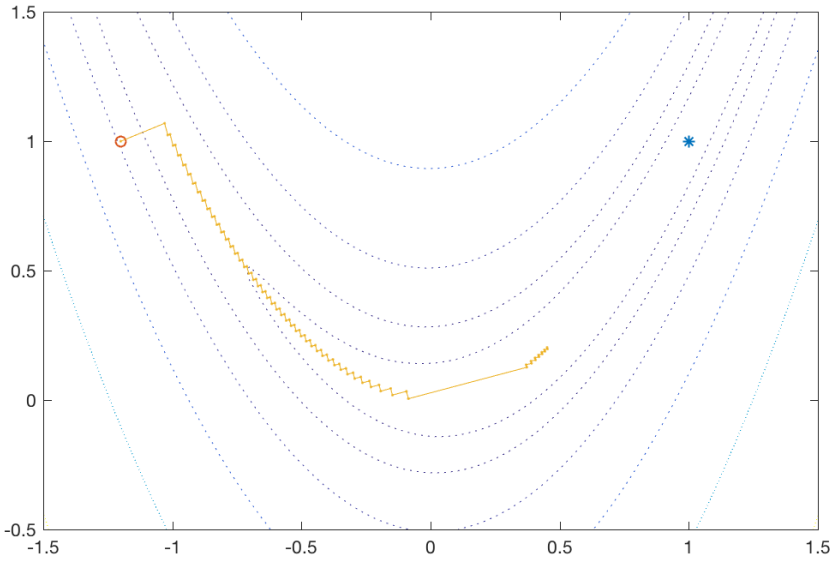


Figure 4: Steepest descent with 100 iterations

Problem (g)

The algorithm took 1884 steps and terminated with $||x - x^*|| = 0.086224$.

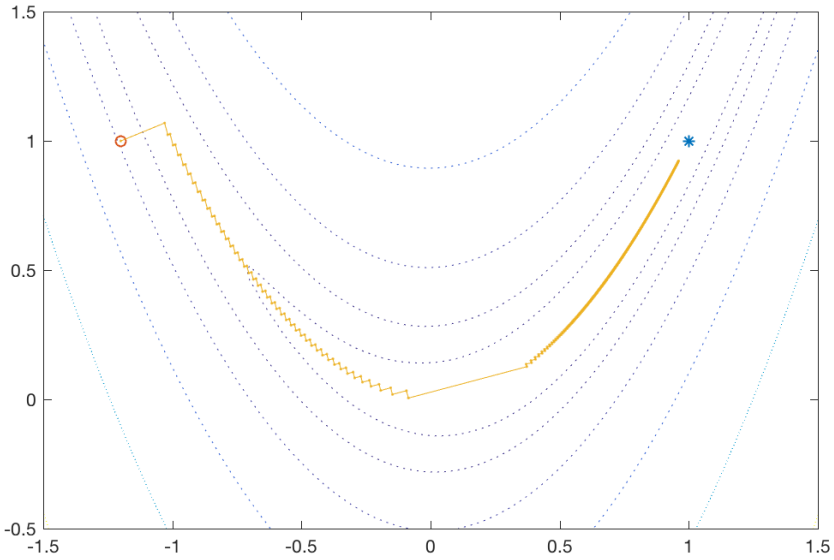


Figure 5: Steepest descent with infinite iterations

Problem (h)

The algorithm took 25678 steps and terminated with $||x - x^*|| = 0$.

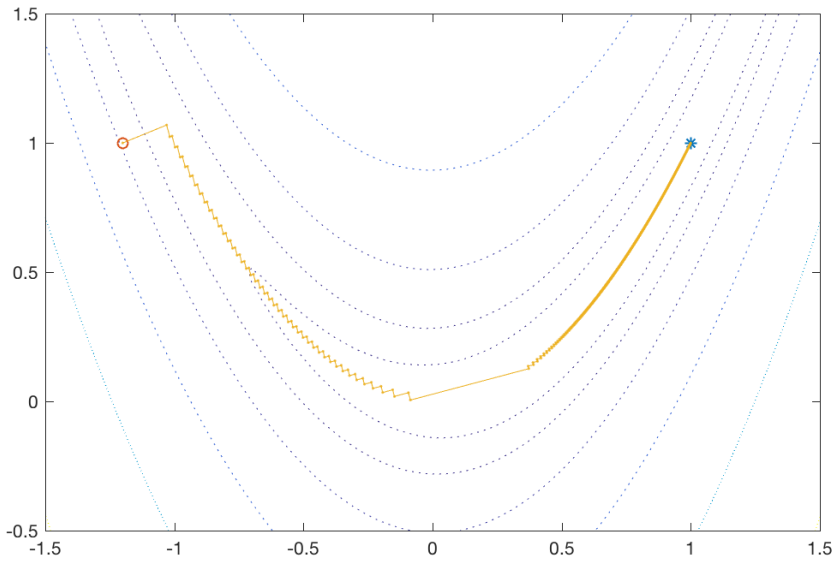


Figure 6: Steepest descent with infinite iterations and small tolerance