

UNIVERSITY OF TEXAS AT AUSTIN

Homework Assignment 9Regression trees.

Please, provide your **complete solutions** to the following problems. Final answers only, even if correct will earn zero points for those problems.

Problem 9.1. (10 points) Solve Problem 8.4.1 from page 361 from the textbook.

Problem 9.2. (5 points) Draw an example of a partition in the plane that **cannot possibly** correspond to recursive binary splitting.

Problem 9.3. (10 points) Solve Problem 8.4.4 from page 362 from the textbook.

Problem 9.4. (10 points) *Source: An old SRM manual.*

Consider the following observations of (X, Y) with X being the predictor and Y being the response:

$$(0, 8), \quad (1, 5), \quad (3, 8), \quad (6, 6).$$

After one iteration of recursive binary splitting, there are two groups of observations. Find the members of the two groups.

Problem 9.5. (15 points) *Source: Sample MAS-II.*

A data set contains six observations for two predictor variables, X_1 and X_2 , and a response variable Y . Here is the table of observations:

X_1	X_2	Y
1	0	1.2
2	1	2.1
3	2	1.5
4	1	3.0
2	2	2.0
1	1	1.6

The following five splits are analyzed:

- I. $R_1(1, 1) = \{X \mid X_1 < 1\}$ and $R_2(1, 1) = \{X \mid X_1 \geq 1\}$
- II. $R_1(1, 4) = \{X \mid X_1 < 4\}$ and $R_2(1, 4) = \{X \mid X_1 \geq 4\}$
- III. $R_1(2, 0) = \{X \mid X_2 < 0\}$ and $R_2(2, 0) = \{X \mid X_2 \geq 0\}$
- IV. $R_1(2, 1) = \{X \mid X_2 < 1\}$ and $R_2(2, 1) = \{X \mid X_2 \geq 1\}$
- V. $R_1(2, 2) = \{X \mid X_2 < 2\}$ and $R_2(2, 2) = \{X \mid X_2 \geq 2\}$

Determine which split is chosen first.