Table 5.13. Data set for Exercise 13.

x	0.5	3.0	4.5	4.6	4.9	5.2	5.3	5.5	7.0	9.5
y	−	−	+	+	+	−	−	+	−	−

V_2, the distance between them is defined as follows:

$$d(V_1, V_2) = \sum_{i=1}^{k} \left| \frac{n_{i1}}{n_1} - \frac{n_{i2}}{n_2} \right|,$$

where n_{ij} is the number of examples from class i with attribute value
n_j is the number of examples with attribute value V_j.

Consider the training set for the loan classification problem shown in
5.9. Use the MVDM measure to compute the distance between every
attribute values for the `Home Owner` and `Marital Status` attributes.

15. For each of the Boolean functions given below, state whether the prol
linearly separable.

    (a) A AND B AND C
    (b) NOT A AND B
    (c) (A OR B) AND (A OR C)
    (d) (A XOR B) AND (A OR B)

16. (a) Demonstrate how the perceptron model can be used to represent th
and OR functions between a pair of Boolean variables.

    (b) Comment on the disadvantage of using linear functions as activatic
tions for multilayer neural networks.

17. You are asked to evaluate the performance of two classification models,
M_2. The test set you have chosen contains 26 binary attributes, label
through Z.

    Table 5.14 shows the posterior probabilities obtained by applying the
to the test set. (Only the posterior probabilities for the positive c
shown). As this is a two-class problem, $P(-) = 1 - P(+)$ and $P(-|A, .$
$1 - P(+|A, \ldots, Z)$. Assume that we are mostly interested in detecting i
from the positive class.

    (a) Plot the ROC curve for both M_1 and M_2. (You should plot ther
same graph.) Which model do you think is better? Explain your

    (b) For model M_1, suppose you choose the cutoff threshold to be $t =$
other words, any test instances whose posterior probability is gre
t will be classified as a positive example. Compute the precisio
and F-measure for the model at this threshold value.