CSCI/PHIL 4550/6550 Artificial Intelligence

Problem Set Number 5: Due on 12/1/2009 (in class)

1. **[25 points]** You are given a learning problem of the following form: Instance description language: 3 binary attributes representing size, color and shape. You are also given the four training examples shown in the table below. Draw the decision tree that ID3 will construct after processing the training examples. How does ID3 classify the test example?

Training Examples:

	Size(Big/Small)	Color(Red/Blue)	Shape(Round/Square)	Member(Yes/No)
1	0	1	1	Yes
2	0	1	0	No
3	0	0	1	Yes
4	1	0	1	No

Test Example:

Size(Big/Small)	Color(Red/Blue)	Shape(Round/Square)	Member(Yes/No)
1	1	1	?

2. **[25 points]** Consider the same set of training examples once again. Suppose you are given the following perceptron with initial values: (w1=.25; w2=.5; w3=.75; theta= 1.0). Suppose the learning rate Eta=0.1. Suppose that your random selection process picks the four training examples above in the order shown. What are the final values of w1,w2,w3 and Theta? How would the resulting perceptron classify the test example?