# Exercises for Support Vector Machines and Decision Trees

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Digging into Data

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# 1 Creating Decision Trees

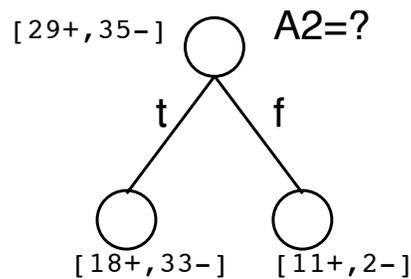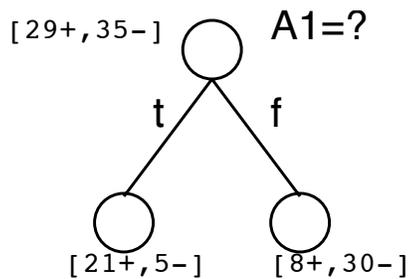Create decision trees for the following functions of $X$ and $Y$.

1. $X$ AND $Y$ (both must be true)

2. $X$ OR $Y$ (either can be true)

3. $X$ XOR $Y$ (one and only one is true)

# 2 Inducing Decision Tree Rules

$$\text{Entropy}(S) \equiv -p_\oplus \log_2 p_\oplus - p_\ominus \log_2 p_\ominus \tag{1}$$

Gain$(S, A)$ = expected reduction in entropy due to sorting on $A$

$$\text{Gain}(S, A) \equiv \text{Entropy}(S) \ - \sum_{v \in Values(A)} \frac{|S_v|}{|S|} Entropy(S_v) \tag{2}$$
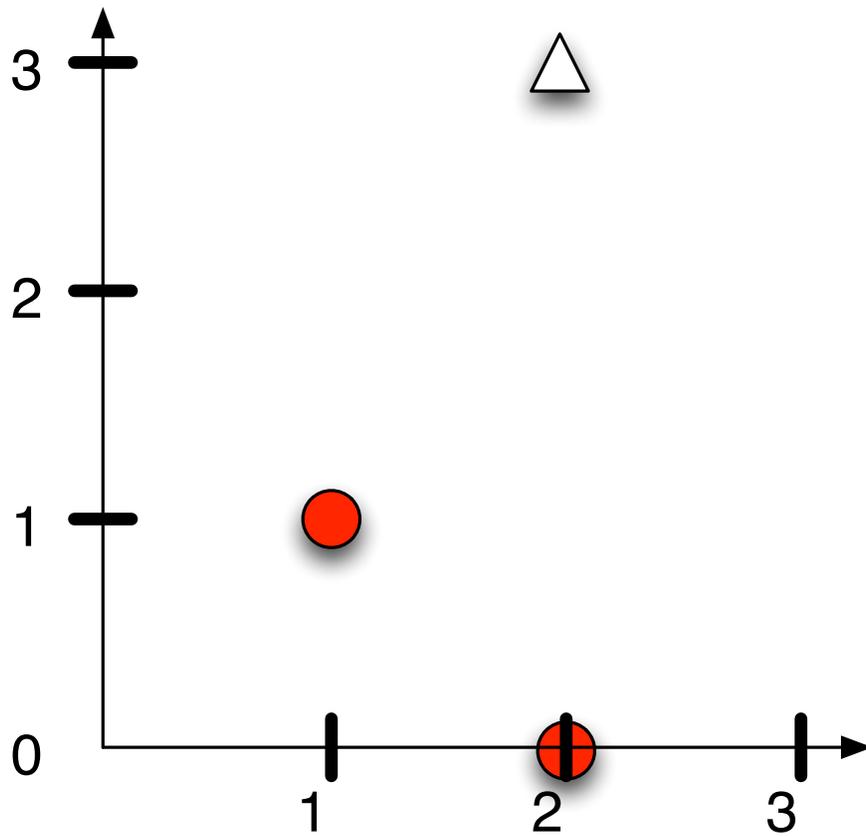
1. Entropy($S$)

2. Gain($G, A_1$)

3. Gain($G, A_2$)

# 3 Support Vector Machines



1. Draw where the decision boundary should be

2. (Bonus) Find the equation for the line