##

Supervised Learning: Support Vector Machine (Linear SVM)
Binary Outcome

Show two ways of splitting a group, ask which one is better? Why?
Increase the margin of errors
Assume that everything is labeled correctly

Want to put a border between the two groups
Goals: As wide as possible, while keeping them separate

Plane can be described by a plane with a normal vector and a scalar b
$w^Tx+b = 0$, w^T (normal vector) is orientation and b (bias) is distance from origin
(normal vector is like the opposite of slope, also has a length)
Width of margin = $2/(||w||)$ or 2 divided by the length of the normal vector
Goal we have to maximize $2/(||w||)$ == $minimize((||w||)/2)$
With the constraints of plus class above -> $w^Tx+b >= 1$
With the constraints of minus class below -> $w^Tx+b <= -1$

This system can be solved by calculus, I will point you to resources if you want to see how

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Supervised Learning: Logistic Regression
Binary Outcome
Point: Use sigmoid/logistic function to create a boundary

-- Want $0 <= h(x) <= 1$
-- $h(x) = g(theta.transpose()*x)$
-- using sigmoid/logistic function
-- $g(z) = 1/(1+e^{-z})$
-- so $h(x) = 1/(1+e^{-theta.transpose()*x})$

Create a decision boundary

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Dimension Reduction: Principal Component Analysis (PCA)
Will not explain the derivation, will explain what is does

Finds directions of maximal variance
After the first one it will find a component that is orthogonal instead of

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