# CS 5630 - Machine Learning

# Linear Regression

*CS 5630 - Machine Learning*

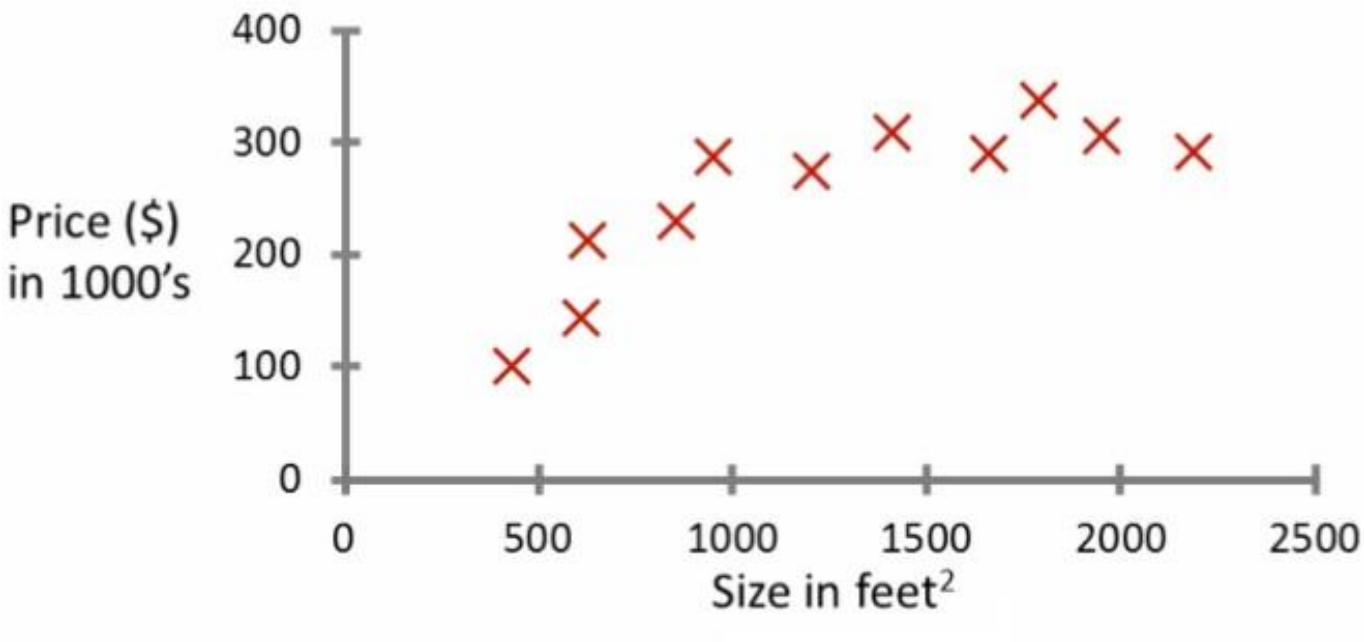
# Overview

- Linear Regression
  - Linear Regression with One Variable
  - Cost Function
  - Parameter Learning

# Linear Regression with One Variable

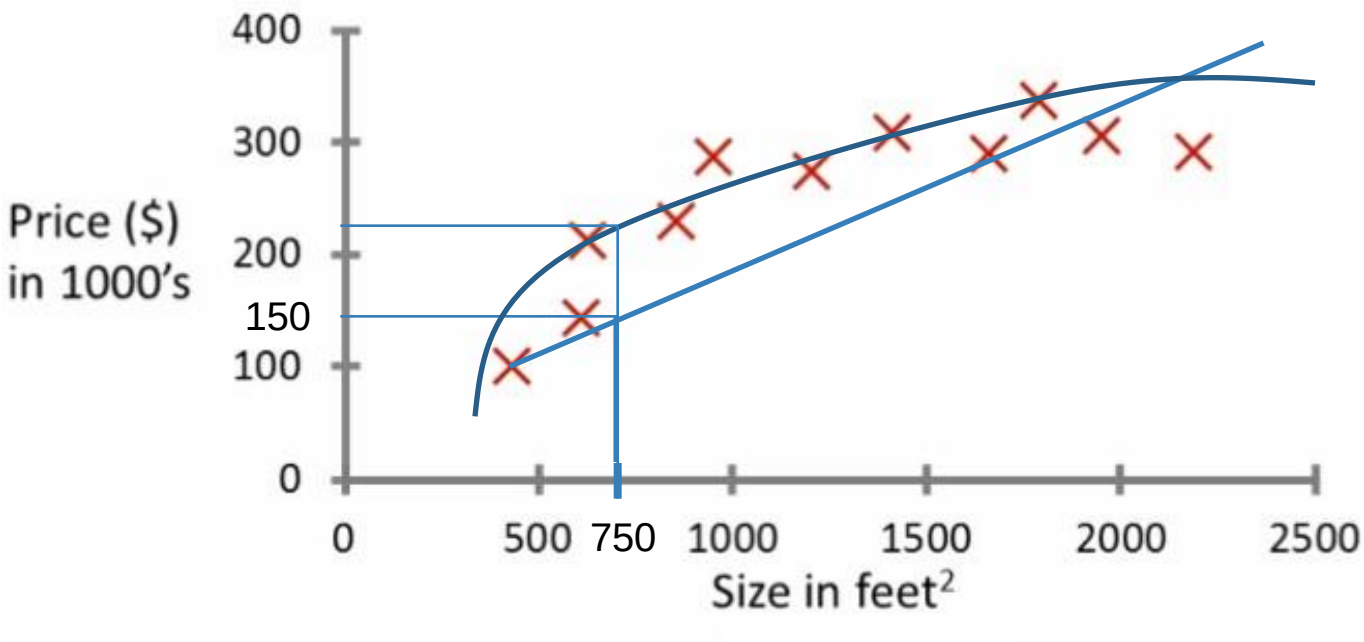
# Linear Regression with One Variable (1)

- Probably the most common problem type in machine learning
- Example : Predicting House Price



# Linear Regression with One Variable (2)

- What is the price of a house whose size is 750 sq. feet?



# Linear Regression with One Variable (1)

- Training Set of Housing Prices

| Size in feet² (x) | Price ($) in 1000's (y) |
|---|---|
| 2104 | 460 |
| 1416 | 232 |
| 1534 | 315 |
| 852 | 178 |
| …. | …. |

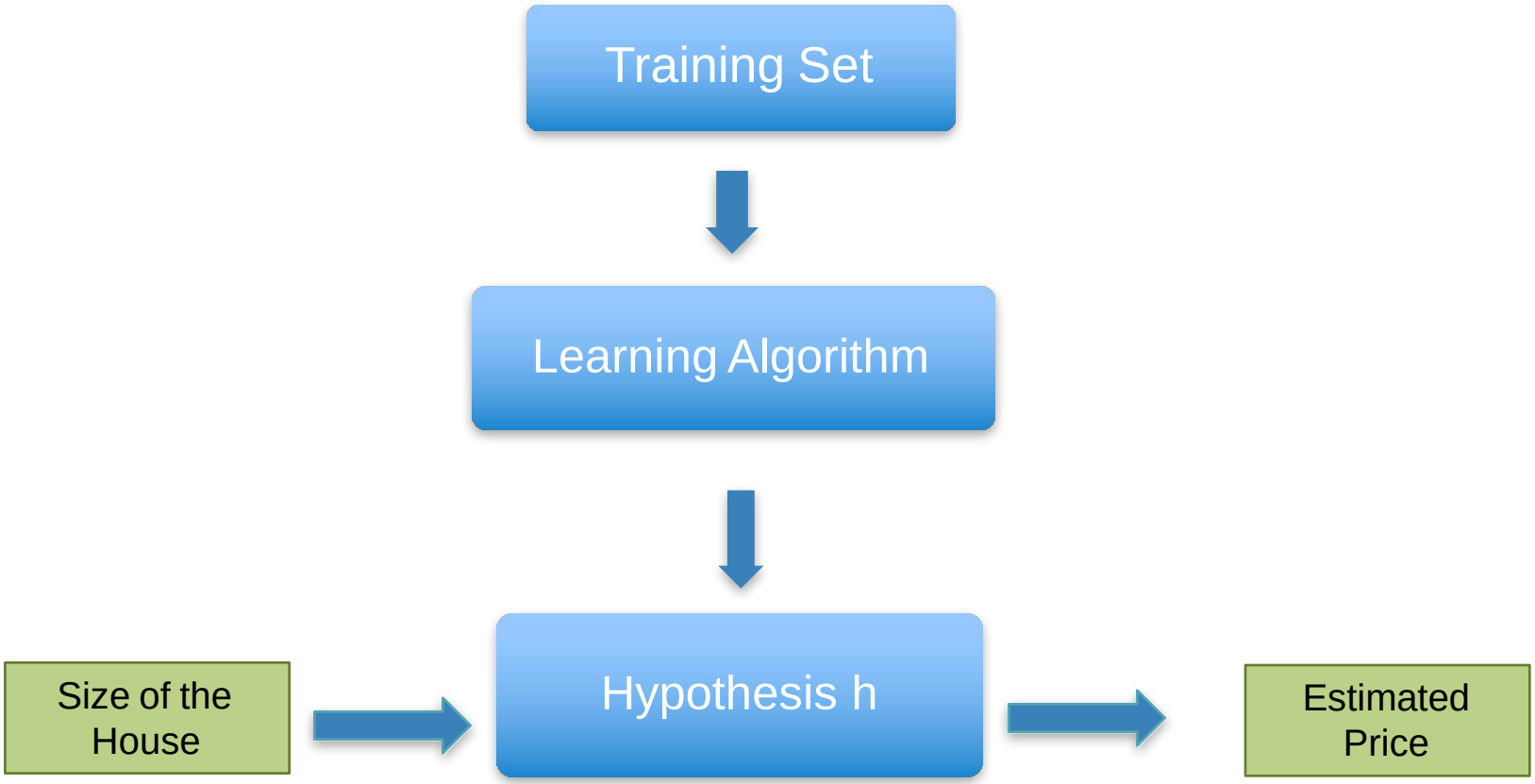
- Notations
  - m = Number of Training Examples
  - x's = input variables (also called features)
  - y's = output variables (also called target variable)

# Linear Regression with One Variable (2)

- Notations
  - m = Number of Training Examples
  - x's = input variables (also called features)
  - y's = output variables (also called target variable)

- More Notations
  - (x,y) – A single training example
  - $(x^{(i)}, y^{(i)})$ – i-th row in the training set
  - $x^2 = 1416$
  - $y^2 = 232$

# Linear Regression with One Variable (3)




h maps x (size of the house) to y (price of the house)

# Linear Regression with One Variable (4)

- How do we represent h?
  - $h_{"}(x) = \theta_0 + \theta_1 x$
  - y as linear function of x (straight line function)
  - Linear Regression with one variable
  - Univariate Linear Regression