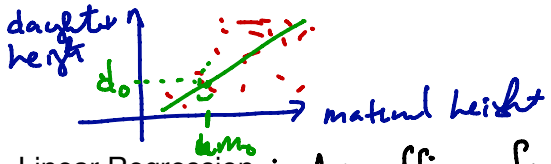

9. Linear Regression : An affine function used to approximate/estimate data.

x - feature vector (data using to predicts stuff)

$\hat{y}$ - prediction

β - coefficient vector

v - offset (constant)

$$\hat{y} = \beta^T x + v = \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + v$$ ← regression model

10. In the chart below, x_1 is house area in 1000 square feet and x_2 is the number of bedrooms. Assume the coefficient vector is $\beta = (148.73, -18.85)$ and $v = 54.40$.

House	x_1 (area)	x_2 (beds)	y (price)	$\hat{y}$ (prediction)
1	0.846	1	115.00	161.37
2	1.324	2	234.50	213.61
3	1.150	3	198.00	168.88
4	3.037	4	528.00	430.67
5	3.984	5	572.50	552.66

Write out the linear approximation $\hat{y}$ given by β and v and confirm that the top entry in the last column is correct.

$\hat{y} = 148.73x_1 - 18.85x_2 + 54.40$ ← the regression model

$\hat{y} = 148.73(0.846) - 18.85(1) + 54.40$

$= 161.3755800$

11. Interpret the coefficients in β.

If we increase house area by 1000 sq.feet (w/o adding any bedrooms), we increase the house price by $148,730

If we increase the # of bedrooms w/o increasing the square footage, then we decrease the house price by $18,850.