

CHAPTER OVERVIEW

3: Linear Regression

Quick review of equations for [lines](#):

Recall the equation of a line is usually in the form $y = mx + b$, where x and y are variables and m and b are numbers. Some basic facts about lines:

- If you are given a number for x , you can plug it in to the equation $y = mx + b$ to get a number for y , which together give you a point with coordinates (x, y) that is on the line.
- m is the *slope*, which tells how much the line goes up (increasing y) for every unit you move over to the right (increasing x) – we often say that the value of the slope is $m = \frac{\text{rise}}{\text{run}}$.
 - *positive*, if the line is tilted up,
 - *negative*, if the line is tilted down,
 - *zero*, if the line is horizontal, and
 - *undefined*, if the line is vertical.
- You can calculate the slope by finding the coordinates (x_1, y_1) and (x_2, y_2) of any two points on the line and then $m = \frac{y_2 - y_1}{x_2 - x_1}$.
- In particular, $x_2 - x_1 = 1$, then $m = \frac{y_2 - y_1}{1} = y_2 - y_1$ – so if you look at how much the line goes up in each step of one unit to the right, that number will be the slope m (and if it goes *down*, the slope m will simply be negative). In other words, the slope answers the question “for each step to the right, how much does the line increase (or decrease)?”
- b is the *y-intercept*, which tells the y -coordinate of the point where the line crosses the y -axis. Another way of saying that is that b is the y value of the line when the x is 0.

[3.1: The Least Squares Regression Line](#)

[3.2: Applications and Interpretations of LSRLs](#)

[3.3: Cautions](#)

[3.4: Exercises](#)

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