

Homework 1

- (1.2) Small fitting error can be used as a good indicator for small prediction error for polynomial models. However, any fitting errors in the training data will likely result in larger errors for the prediction data. The extent to how large these errors are for the prediction error is dependent on several factors like how many data points were in the training data, the degree polynomial that was used, and how normal the future data will be. (See hw1-1.2.py and hw1-1.2.png.)
- (1.3) (a) $10^{10} = 10,000,000,000$.
(b) $10! = 3,628,800$.
- (1.4) $p = 1 - 0.996^{250} \approx 1 - 0.3671 = 0.6329$.
- (1.7) (a) mean = 0.0465. standard deviation = 0.6234. (See hw1-1.7.py and hw1-1.7a.png.)
(b) mean = 0.0429. standard deviation = 0.2558. (See hw1-1.7.py and hw1-1.7b.png.)
- (1.13) Ancient civilizations' theories for predicting periodic events represent empirical knowledge because their explanations were based on observations and their religion at the time. They used these periodic events to support their beliefs. For example, they believed that "each night was ruled by one of the nine lords of the underworld" to explain the lunar series, and they were able to predict that each lunar month was about 29.5302 days, and compared with the value we have today (29.5305877), they were incredibly accurate.¹ Even though they were very precise, their underlying theories of explaining planetary motion relied on heavenly beings, which we now know is erroneous.

¹ http://en.wikipedia.org/wiki/%20Maya_calendar