

CSE 5105 (Fall 2025) Assignment 3

Due Monday, 24 November 2025

1. Replicate figure 2.1 in the Bayesian optimization book (bayesoptbook.com) from scratch in an environment such as Python, R, or Julia. I will post hints to slack. This should require less than 100 lines of code.
2. Replicate figure 2.2 in the Bayesian optimization book (bayesoptbook.com) from scratch in an environment such as Python, R, or Julia. I will post hints to slack. This should require less than 100 lines of code.
3. Replicate figure 2.3 in the Bayesian optimization book (bayesoptbook.com) from scratch in an environment such as Python, R, or Julia. I will post hints to slack. This should require less than 100 lines of code.
4. Consider a Gaussian process on $f: \mathbb{R}^d \rightarrow \mathbb{R}$, $p(f) = \mathcal{GP}(f; \mu, K)$. Suppose μ and K are differentiable with respect to their inputs. Consider the i th partial derivative of f at some point x :

$$f'_i = \frac{\partial f}{\partial x_i}(x).$$

Show that f'_i has a Gaussian distribution. What is its mean and variance? Hint: work from the definition of the partial derivative and use the fact that a limiting sequence of Gaussian distributions is Gaussian.