HW #3

1. Bishop 6.4
2. Bishop 6.11
3. Bishop 6.15

4. GP regression

Re-use or recreate the Bessel function \((J_0(x))\) dataset from HW #1, problem 3.

Fit this data using GP with

(a) RBF kernel: \(k(x_n, x_m) = e^{-\frac{\theta}{2}(x_n-x_m)^2}\)

(b) exponential kernel: \(k(x_n, x_m) = e^{-\theta|x_n-x_m|}\)

→ Find \(\hat{\theta}\), the optimal value of \(\theta\) for both kernels, by maximizing \(\log p(\tilde{y}|\theta)\) wrt \(\theta\). Report both \(\hat{\theta}\) and \(\log p(\tilde{y}|\hat{\theta})\).

→ For both kernels, find \(\mu\) and \(\sigma\) of the predictive distribution, using \(\theta = \hat{\theta}\).
Plot $J_0(x)$, $t$, and $\mu \pm 6$ separately for each kernel.

Note: it is allowed to use standard GP implementations, as opposed to recreating GP regression from scratch.