Take-Home Quiz 4 (Review and Application)

1 Problem 1(GP)

We have a zero mean Gaussian process with covariance matrix equals to:

$$Cov(y_i, y_{i'}) = 0.5^2\delta_{i,i'} + K(x_i, x_{i'}) \tag{1}$$

K is noise free covariance function defined by:

$$K(x, x') = \begin{cases} 1 - |x - x'| & \text{if } |x - x'| < 1 \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

suppose we have four training data as below:

x	y
0.5	2.0
2.8	3.3
1.6	3.0
3.9	2.7

Find the predictive mean for the response in a test case in which the input is $x^* = 1.2$.

2 Problem 2(PP)

Let $\{N(t)\}$ be a rate λ Poisson process, with arrival times $\{S_n, n = 0, 1, ...\}$. Evaluate the expected sum of squares of the arrival times occurring before t,

$$E(t) = \mathbb{E}\left[\sum_{n=1}^{N_{(t)}} S_n^2\right],$$

where we define $\sum_{n=1}^{0} S_n = 0$.

3 Problem 3(PP)

In the first problem of your IC-Quiz4, give an intuitive explanation of why we need only consider the cases $s = 0$ and $s = \infty$ when minimizing the expected time.