1. Bishop 6.18

2. Gaussian processes for regression
   
   Generate $N = 16$ equidistant data points using $f(x) = \sin(x) + \eta$, $x \in [0, \frac{3\pi}{2}]$. 

   Here, $\eta = \mathcal{N}(0, 0.1^2)$ is random noise. 

   Fit this data using Gaussian processes for regression, with the Gaussian kernel: 

   $$ k(x_n, x_m) = e^{-\frac{\theta_1}{2} \| x_n - x_m \|^2} $$ 

   [Here, $k(x_n, x_m) = e^{-\frac{\theta_1}{2} (x_n - x_m)^2}$]

   Write out the predictive distribution and plot its mean and $\pm 2\sigma$ for

   $\theta_1' = 1 \& \theta_1'' = 64$ in the $[0, 2\pi]$ range (note the extended range) 

   Show your work, including the expressions for mean & covariance of the predictive distribution.

Add the data points (with noise) and $\sin(x)$ to both plots.