The scallops dataset is available online. The variable of interest is the *tcatch* which has a skewed distribution. The variable $Z = \log(tcatch + 1)$ has approximately a normal distribution. We will fit the following model

$$Z(\boldsymbol{s}) = \mu + \epsilon(\boldsymbol{s})$$

where μ is a constant and $\epsilon(\boldsymbol{s})$ is stationary Gaussian with mean 0 and an exponential covariogram

$$C(h) = \sigma^2 \exp(-h/\theta).$$

1. Find the maximum likelihood estimates for μ, σ^2 and θ.

2. Plot the empirical semivariogram and the fitted semivariogram in one graph.

3. Choose and show a sensible polygon inside of which the ordinary kriging will be carried out.

4. Carry out the ordinary kriging for Z at grid points inside the polygon; Draw contour plots for the predicted value and prediction variance.