

STA465/STA2016: Homework 4

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Please submit your answers to Question 1 as a **single pdf document** via Quercus. It will be **Due Thursday 16 April, 2019 at 12pm (Midday)**. Late submissions will be heavily penalized. I recommend preparing it using RMarkdown

Question 1

1. Simulate a homogenous Poisson process on the rectangle $[0, 100] \times [0, 50]$ with the property that the expected number of points is 650.
2. Using a half-normal detection function with a half-width of 2, simulate a thinned point process resulting from distance sampling on a set of 10 equally spaced parallel vertical lines.
3. Using the same detection function, simulate a thinned point process using 10 random transects (NB: They don't have to go from boundary to boundary.)
4. Build a mesh over the boundary (using `inla.mesh.2d`) and fit a log-Gaussian Cox process to the data sets using INLABru and plot the posterior distribution of the **total** number of points on the observation window. Comment on how this compares to the true number of points. (NB: The true number of points will not be 650 and will be different for everyone).
5. Repeat the exercise for 20 different sets of random transects (same set up as part 3) and comment on the frequentist properties of the estimate for the total number of points.