# Assignment 9

PM522b Introduction to the Theory of Statistics Part 2

Due: April 12, 2018

1. Let $X_1, ..., X_n$ be a random sample from the Poisson distribution with mean $\lambda$. Derive the most powerful test for testing $H_0 : \lambda = 2$ versus $H_1 : \lambda = 1/2$.

2. Explain what is meant by the power of a test and describe how the power may be used to determine the most appropriate size of a sample. Then, given $X_1, ..., X_n$ from the Weibull distribution $f(x|\gamma, \beta) = \frac{\gamma}{\beta^\gamma} x^{\gamma-1} e^{-(x/\beta)^\gamma}$ for $x > 0$, $\beta > 0$ is unknown and $\gamma > 0$ is known, find the form of the most powerful test of the null hypothesis that $H_0 : \beta = \beta_0$ versus $H_1 : \beta = \beta_1$ where $\beta_0 > \beta_1$.

3. Given two independent random samples $X_1, ..., X_n$ and $Y_1, ..., Y_m$ with normal distributions $N(\mu_x, \sigma_x^2)$ and $N(\mu_y, \sigma_y^2)$, determine a generalized likelihood ratio test for $H_0 : \mu_x - \mu_y = 0$ versus $H_1 : \mu_x - \mu_y \neq 0$ at a given significance level $\alpha$ ($\sigma_x, \sigma_y$ unknown but equal). This question is a bit lengthy.

4. Finish CB 8.37 (we did part c in class, please complete parts a and b)

5. CB 8.17