Math Stat, HW3, due Monday 2/10

Practice problems:

1. Let $X_1, X_2, ..., X_n$ be a random sample from a normal distribution with variance 1 and unknown mean μ. Find the MLE and MOME of μ.

2. Let $X_1, X_2, ..., X_n$ be a random sample from a normal distribution with mean 0 and unknown standard deviation σ. Find the MLE and MOME of σ.

Turn-in problems

1. Let $X_1, X_2, ..., X_n$ be a sample from a distribution with pdf

$$f(x) = ax\, e^{-ax^2/2}, \quad x \geq 0$$

(a) Find the MLE and MOME of a.
(b) Compute the numerical values of the MLE and MOME for the observed sample $0.45, 0.31, 1.44, 0.30, 0.68$.

For the MOME, you need this result:

$$\int_0^\infty x^2 e^{-ax^2/2} dx = \frac{\sqrt{2\pi}}{2a\sqrt{a}}$$

2. Let $X_1, ..., X_n$ be a sample from a uniform distribution on $[-\theta, \theta]$ where θ is unknown. Find the MLE of θ. If you cannot find it explicitly, make an educated guess inspired by the MLE we found for the unif$[0, \theta]$ distribution in class Wednesday. Note that here, the X values can be both negative and positive but the parameter θ is positive.