Note: Homework will not be collected, but the question for Quiz 2 might be picked from the homework questions.

1. Let $X$ be the binomial random variable with parameter $n$ and $p$, where $n$ is known but $p$ is not. Let $x_1, \ldots, x_n$ be sample values for $X$.
   
   (a) Compute the log likelihood function $\ell(p)$ for $X$.
   
   (b) Show that the MLE for $p$ is $\frac{x_1 + \ldots + x_n}{n}$.

2. Let $X$ be the geometric random variable with unknown parameter $p$. Let $x_1, \ldots, x_n$ be sample values for $X$.
   
   (a) Compute the log likelihood function $\ell(p)$ for $X$.
   
   (b) Show that the MLE for $p$ is $\frac{n}{x_1 + \ldots + x_n}$.

3. Let $X$ be the Poisson random variable with unknown parameter $\lambda$. Let $x_1, \ldots, x_n$ be sample values for $X$.
   
   (a) Compute the log likelihood function $\ell(\lambda)$ for $X$.
   
   (b) Show that the MLE for $\lambda$ is $\frac{x_1 + \ldots + x_n}{n}$.

4. Let $X$ be the uniform random variable on the interval $[0, \theta]$ with unknown parameter $\theta$.
   
   (a) Let $x_1, \ldots, x_n$ be sample values for $X$. Show that the MLE for $\theta$ is given by
      
      $\hat{\theta}(x_1, \ldots, x_n) = \max(x_1, \ldots, x_n)$.
   
   (b) Show that $\hat{\theta}$ is a biased estimator for $\theta$.

5. Show that maximum likelihood estimation and method of moments give the same estimators for $N(\mu, \sigma^2)$.

6. Solve Problem 6.4-7 in the textbook.

7. Solve Problem 6.4-17 in the textbook.