1. For a binomial distribution find its moment generating function and the first 3 moments.

2. For a Poisson distribution find its first 3 central moments.

3. For a Gamma distribution (defined in formula (1.5.41)) find its moment generating function, its mean and variance.

4. Let $X_1, \ldots, X_m$ and $Y_1, \ldots, Y_n$ be independent random variables from $N(\xi, \sigma^2)$ and $N(\eta, \tau^2)$, respectively. Find the minimal sufficient statistics for
   (a) arbitrary $\xi, \eta \in \mathbb{R}, \sigma, \tau > 0$;
   (b) arbitrary $\xi, \eta \in \mathbb{R}$ and $\sigma = \tau > 0$;
   (c) arbitrary $\xi = \eta \in \mathbb{R}, \sigma, \tau > 0$.

5. For a random sample from $N(\xi, \xi^2), \xi > 0$, find the minimal sufficient statistics.

6. Let $X_1, \ldots, X_n$ be i.i.d. from $U(a, b)$. Find the minimal sufficient statistics for
   (a) arbitrary $a, b \in \mathbb{R}$;
   (b) arbitrary $a \in \mathbb{R}, b = a + 1$.

7. Let $X_1, \ldots, X_n$ be i.i.d. from $E(a, b)$.
   (a) Show that $(X_{(1)}; \sum [X_i - X_{(1)}])$ is minimal sufficient;
   (b) Prove that $(X_{(1)}$ and $\sum [X_i - X_{(1)}])$ are independent, and $X_{(1)} \sim E(a, b/n)$ and $\sum [X_i - X_{(1)}] \sim \Gamma(n - 1, b) = \frac{b \xi^2}{2 \xi^2 + 2}$. Hint: use Basu’s theorem and moment generating functions.