MSO205 PRACTICE PROBLEMS SET 10

Question 1. Let X, Y be RVs defined on the same probability space. Fix $a, b, c, d \in \mathbb{R}$ and set $U = a + bX, V = c + dY$. Express $\rho(U, V)$ in terms of $\rho(X, Y)$.

Question 2. Let X_1, X_2, X_3 be a random sample from $Bernoulli(p)$ distribution, for some $p \in (0, 1)$. Find the p.m.f. of $X_{(2)}$.

Question 3. Let $X_1, \cdots, X_n$ be a random sample from $Uniform(0, 1)$ distribution. Identify the distribution of $X_{(r)}$ for $r = 1, \cdots, n$.

Question 4. Let $X_1, \cdots, X_n$ be a random sample from a distribution given by a p.d.f. f. Find the joint p.d.f. of $(X_{(r)}, X_{(s)})$ of $1 \leq r < s \leq n$.

Question 5. Compute the factorial moments for Negative Binomial and Hypergeometric distribution.

Question 6. Suppose a pair of fair die are rolled seven times independently. Find the probability that the sum of the dots obtained is 12 once and 8 twice.

Question 7. If $X_1, X_2, \cdots, X_n$ are i.i.d. $Geometric(p)$ RVs, for some $p > 0$, then find the distribution of $X_1 + X_2 + \cdots + X_n$.