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Question d)

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$$P(U_{(k)} \leq x, y < U_{(k+1)})$$

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$$= \binom{n}{k+1} x^{k+1} (1-y)^{n-k-1} + \frac{n!}{k!1!(n-k-1)!} x^k (y-x)(1-y)^{n-k-1} + \binom{n}{k} x^k (1-y)^{n-k}$$