Assignment 1. CS211, Section B and F

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I. Problem Statement

Write a C++ program which calculates the value of the variable $R_{K,n}(p)$,

$$R_{K,n}(p) = (1 - p^n)^K \cdot \exp(-\lambda)$$

$$\lambda = \sum_{\ell=2}^{K} \lambda_\ell$$

$$\lambda_\ell = \binom{K}{\ell} \frac{\alpha_\ell}{(1-p^n)^\ell}$$

$$\alpha_\ell = \rho_\ell - \sum_{s=1}^{\ell-1} \binom{\ell-1}{s} \rho_s \alpha_{\ell-s}$$

$$\rho_\ell = \left[\frac{1}{q} \left(1 + (q-1) \left(1 - \frac{q(1-p)}{q-1} \right)^\ell \right) \right]^n$$

Students from Section B should take the value of p and q as follow $p = 0.90$, $q = 2$, and students from Section F should take the value of $p = 0.95$, $q = 4$.

The value of n should taken as follow. Sum up the last 4 digits of your roll number, so if your roll number is 17K-1234, the value of n will be $n = 1 + 2 + 3 + 4 = 10$. The value of K is given as follow. Multiply the last 4 digits of your roll number and take modulus 50, and add 50. So if your roll number is 17K-1234, the value of K would be given as, $K = 50 + (1 * 2 * 3 * 4)\%50$, which would be equal to $K = 50 + 24 = 74$.

II. submission

Submit a single pdf file which includes your full name, roll number, and section as part of heading. And the following: C++ program code, without line numbers, I should be able to copy-paste the code on my IDE and run it with any changes (hint: You should be able to write the program using approximately 150 lines). The value of n, K, p and q used in your program (these should be values which you should selected as stated earlier). The solution, i.e. the value of $R_{n,K}(p)$ to five decimal places.

As the equation uses recursive function you will need to use hashing table or array to store pre-computed values which can be used again in future calculations, otherwise due to the the large running time of the program, your program will not return you back a value.

Submission deadline will be **07/Nov/2018**, before **11pm** through slate. Submission after deadline (max. 1 day) will incur penalty of 20% deduction of marks. In an unlikely event slate is down, you can email me the assignment by email jalaluddin.qureshi@nu.edu.pk providing screenshot that slate is down. There will be no extension in deadline. The weightage of this assignment would be announced later during lecture.

Marking criteria, out of 10 (guideline): Full working program with correct solution 9. Program part working but not generating correct solution 3. Some vague effort done to write the program 1. Follows submission guideline plus $1 \times \frac{marksawarded}{9}$.