Mathematics for Computer Science
Spring 2019
Due: 23:59, April 22, 2019

Homework Set 8

Do the following special problems:

Special Problem 1 (counted as 10 exercises) In class we discussed the *Mr. P and Mr. S problem*, in which a conversation with 4 rounds of communications takes place. Let $2 \leq m < n \leq 99$. Of the $\binom{98}{2} = 4753$ pairs of (m, n) in the range, let a_j be the number of pairs leading to this conversation (exactly as stated in class) stopping (and unable to continue) after exactly j rounds for $j = 0, 1, 2, 3, 4$, respectively. You should get $a_4 = 1$.
Question: Write a computer program and determine the values of a_0, a_1, a_2, a_3, a_4. You should give a concise explanation of the principles of your design.

Special Problem 2 (counted as 4 exercises) Let $\mathcal{C}$ be the unit circle on the complex plane, traversed counter-clockwise. Let n be any integer (positive, negative and zero), and $A_n = \oint_{\mathcal{C}} z^n$. Determine the value of A_n. You should give a justification of your answer.