Computer Science Department **Kuwait University**

Date: 14/3/2022 CS211 (Theory of Computation I)

DUE: March 22nd **HOMEWORK I (CO1)**

NAME: **ID:**

Notes: 1- Type your solution in this file using MS Word and save it using your ID followed by the letters H1 as a filename (For example, 12345678H1.docx)

2- Submit your solution as a single PDF file using Moodle.

3- Organization and Presentation worth 20% of the mark.

Q1. Problem 40 – page 16 in Textbook . (Proof by contradiction)

Q2. Prove by *induction* that $\sum_{k=0}^{n} x^k = \frac{x^{n+1}-1}{(x-1)}$

Q3. Language L on $\Sigma=\{0, 1\}$ is defined as $L=\{ 0^{2k+1} 1^{2m} \mid k, m \geq 0\}$.

a) Write all words in L of size <= 4 .

b) Find a grammar for L.

Q4. Design a grammar for $L= \{ a^{2k} b^{2m+1} c^{n} \mid k \geq 1, m \geq 0, n \geq 0\}$.

Show the derivation of the string **aabbbbbcc**.

Q5. Design a grammar for $L = \{ v\, w\, v: \mid v, w \in \{a,b\}^*, |v|=2 \}$.

Show the derivation of the string **ababbaab.**