MAT 146, Spring 2019
Homework Assignment 1

Due before the start of the class on Monday, April 8

Please read Sections 1.1 and 1.2 of the textbook before starting on the problem set.

Written Assignment:

Section 1.7: 1. Find the generating functions for each of the following sequences in closed form. In each case the sequence is defined for $n \geq 0$: (a) $a_n = n$ (b) $a_n = \alpha n + \beta$ (c) $a_n = n^2$ (f) $a_n = 3^n$ (g) $a_n = 5 \cdot 7^n - 3 \cdot 4^n$.

3. If $f(x)$ is the generating function of the sequence $\{a_n\}_{n \geq 0}$, then express simply, in terms of $f(x)$, the generating functions of the following sequences: (a) $\{a_n + c\}$ (b) $\{\alpha a_n + c\}$ (c) $\{n a_n\}$ (e) $0, a_1, a_2, a_3, \ldots$ (g) $a_0, 0, a_2, 0, a_4, 0, a_6, 0, a_8, \ldots$ (h) $a_1, a_2, a_3, \ldots$

6. In each part, a sequence $\{a_n\}_{n \geq 0}$ satisfies the given recurrence relation. Find the generating function for this sequence:

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\begin{aligned}
\text{(a)} \quad & a_{n+1} = 3a_n + 2 \quad && (n \geq 0, a_0 = 0), \\
\text{(b)} \quad & a_{n+2} = 2a_{n+1} - a_n \quad && (n \geq 0, a_0 = 0, a_1 = 1), \\
\text{(c)} \quad & a_{n+1} = a_n/3 + 1 \quad && (n \geq 0, a_0 = 0).
\end{aligned}
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The homework must be legible, and written in connected sentences that explains what you are doing. Just the answer (whether correct or not) is not enough. Please put your name and section number on every page and staple the pages together. Homework should be handed in on time, late homework will not be graded.