

CSC236 tutorial exercises, Week #7

Here are your tutorial sections:

Surname	Time	Room	TA
A-K	Friday 11	SS1088	Zhaowei
L-Tg	Friday 11	SS2105	Hamed
Th-Z	Friday 11	BA2175	Gal
A-L	Friday noon	AB114	Wen
M-Z	Friday noon	BF323	Lauren
A-K	Friday 1	BA1170	Ammar
L-Tg	Friday 1	AB107	Alex
Th-Z	Friday 1	AB114	Shems
A-K	Thursday 8	BA2139	Zach
L-Tg	Thursday 8	BA2185	Ekansh
Th-Z	Thursday 8	BA2195	Danniel

These exercises are intended to give you more practice with recurrence relations.

1. Consider the recurrence relation

$$T(n) = \begin{cases} 1 & n = 1 \\ 1 + T\left(\left\lfloor \frac{n}{2} \right\rfloor\right) & n > 1 \end{cases}$$

Prove that $T(n)$ is non-decreasing.

2. Use repeated substitution (unwinding) to find a closed form for the recurrence S when n is a power of 3.

$$S(n) = \begin{cases} 1 & n < 3 \\ n^2 + a_1 S\left(\left\lfloor \frac{n}{3} \right\rfloor\right) + a_2 S\left(\left\lfloor \frac{n}{3} \right\rfloor\right) & n > 2 \end{cases}$$

where $a_1, a_2 \geq 0 \in \mathbb{N}$ and $a_1 + a_2 = 3$.