CSCI 1311: Quiz 4

24 Feb 2020

Name: _____ **email:** _____

Question Weighting

Question:	1	2	Total
Points:	7	8	15
Score:			

The quiz is graded out of 10 points, although you can earn up to 15 points for this quiz.

Consider the following recurrence relation

$$\boxed{t_1 = 3 \qquad t_k = 3t_{k-1} + 2}$$

1. **[7 points]** After expanding t_k , the i'th step can be written as

$$t_k = 3^i t_{k-i} + 2\sum_{j=0}^{i-1} 3^j$$

Complete the solution to the recurrence relation to show that $t_k = 3^k + 3^{k-1} - 1$

2. **[8 points]** Using induction, prove the following lemma:

   If $t_k = 3t_{k-1} + 2$ and $t_1 = 3$, then $t_k = 3^k + 3^{k-1} - 1$

HINT: The geometric sum

$$\sum_{i=0}^{n-1} r^i = \frac{1 - r^n}{1 - r}$$