3) (10 pts) ANL (Recurrence Relations)

Use the iteration technique to solve the following recurrence relation in terms of n:

$$T(n) = 3T(n-1) + 1, for\ all\ integers\ n > 1$$
$$T(1) = 1$$

Please give an exact closed-form answer in terms of n, instead of a Big-Oh answer.

(Note: A useful summation formula to solve this question is $\sum_{i=0}^{n} x^i = \frac{x^{n+1}-1}{x-1}$.)