David Luo
Exercise 2.13

5/5

If we multiply both sides by $n+1$, then we get, through telescoping,

$$(n+1)a_n = na_{n-1} + n + 1 = (n-1)a_{n-2} + 2n + 1 = (n-2)a_{n-3} + 3n = ...$$

$$(n+1)a_n = a_0 + \sum_{i=1}^{n} i + 1 = a_0 + n + \frac{n(n+1)}{2}$$

$$a_n = \frac{a_0+n}{n+1} + \frac{n}{2} = \frac{1+n}{n+1} + \frac{n}{2}$$

$$a_n = \frac{n}{2} + 1$$

Plugging and chugging with the given recurrence shows that a_n is indeed equal to $\frac{n}{2}+1$:

n	1	2	3	4
a_n	3/2	2	5/2	3