[10-05-14-T11]

■ **Find the nth term and the sum of the first n terms of the following sequences. Do this by using the progression of differences.**

[1] 1, 2, 5, 14, 41, 122, 365, 1094, ...

[2] 2, 3, $\frac{7}{2}$, $\frac{15}{4}$, $\frac{31}{8}$, $\frac{63}{16}$, $\frac{127}{32}$, $\frac{255}{64}$, ...

[3] 1, 2, 0, 4, −4, 12, −20, 44, ...

Answers

[1] 1, 2, 5, 14, 41, 122, 365, 1094, ...

$a_n = \frac{1}{6}(3 + 3^n)$

$s_n = \frac{1}{4}(2n + 3^n - 1)$

[2] 2, 3, $\frac{7}{2}$, $\frac{15}{4}$, $\frac{31}{8}$, $\frac{63}{16}$, $\frac{127}{32}$, $\frac{255}{64}$, ...

$a_n = 4 - 2^{2-n}$

$S_n = 4(n + 2^{-n} - 1)$

[3] 1, 2, 0, 4, −4, 12, −20, 44, ...

$a_n = \frac{1}{6}((-2)^n + 8)$

$S_n = \frac{1}{9}(12n + (-2)^n - 1)$