# Discrete Assignment

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**Question**

If the sum of the first $n$ terms of an AP is $4n - n^2$, what is the first term ($S_1$)? What is the sum of the first two terms? What is the second term? Similarly, find the 3rd, the 10th, and the $n$th terms.

**Answer**

$$S_n = 4n - n^2$$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

$$\frac{n}{2}[2a + (n-1)d] = 4n - n^2$$

$$\frac{n}{2}[2a + nd - d] = 4n - n^2$$

$$2a + (n-1)d = 8 - 2n$$

$$S_2 = a + (a + d)$$

Given that $S_2 = 4$:

$$4 = 2a + d$$

$$\begin{cases} 2a + (n-1)d = 8 - 2n \\ 2a + d = 4 \end{cases}$$

$$a = 3 \quad \text{and} \quad d = -2$$

$a_1 = 3$, $a_2 = 3 - 2 = 1$.

$$a_3 = 3 - 4 = -1$$

$$a_{10} = 3 - 18 = -15$$

$$a_n = 3 - 2n + 2 = 5 - 2n$$