Assignment 10.5.12
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Question

Two APs have the same common difference. The difference between their hundredth terms is 100. What is the difference between their thousandth terms?

Solution:

Let d be the common difference and a be the first term of the arithmetic progression The n-th term of an AP is given by the formula:

$$a_n = a + (n-1)d \tag{1}$$

The difference between the hundredth term and the first term is given by:

$$a_{100} - a_1 = (a + 99d) - a = 99d \tag{2}$$

Given that this difference is 100:

$$99d = 100 \tag{3}$$

Solving for d: $d = \frac{100}{99}$

Now, we want to find the difference between the thousandth term and the first term: $a_{1000} - a_1 = (a + 999d) - a = 999d$

Substituting the value of d:

$$999(\frac{100}{99}) \tag{4}$$

The difference between the thousandth terms is $\frac{100}{1} = 100$.

So, the difference between the thousandth terms is 100.