Assignment 11.9.5_1Q

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Question

Show that the sum of $(m+n)^{th}$ and $(m-n)^{th}$ terms of an $A.P.$, is equal to twice the m^{th} terms.

Solution: Theory

PARAMETER	VALUE	DESCRIPTION
$x(0)$	$x(0)$	First term
d	d	common difference
$x(n)$	$[x(0)+nd]u(n)$	General term of the series

Table: Parameter Table1

Theory

For an AP,

$$x(n) = [x(0) + nd]u(n) \tag{1}$$

$$\implies x(m+n) + x(m-n) = [x(0) + (m+n)d] + [x(0) + (m-n)d] \tag{2}$$

$$= 2[x(0) + md] \tag{3}$$

$$\therefore x(m+n) + x(m-n) = 2x(m) \tag{4}$$

Theory

$x(0)$	3
d	2
m	6
n	2
$x(m+n)$	19
$x(m-n)$	11
$x(m)$	15

Table: Verified Values

Code

```c
#include <stdio.h>

// Function to calculate the general term of an arithmetic progression
int general_term(int x0, int d, int n) {
    return x0 + n * d;
}

int main() {
    int m, n, x0, xm, xm_n, xm_n_sum_xm, d;

    m = 6;
    n = 2;

    // Given values for the AP
    x0 = 3; // Changed x0 to 3
    d = 2;

    // Calculating the terms
    xm = general_term(x0, d, m);
    xm_n = general_term(x0, d, m - n);
    xm_n_sum_xm = general_term(x0, d, m + n) + xm_n;

    // Checking if the sum of (m+n)th and (m-n)th terms is equal to twice the mth term
    if (xm_n_sum_xm == 2 * xm) {
        printf("Therefore x(m+n) + x(m-n) = 2 * x(m)\n");
    } else {
        printf("The sum of (m+n)th and (m-n)th terms is NOT equal to twice the mth term.\n");
    }

    return 0;
}
```