

EE23BTECH11042 - Khusinadha Naik*

EXERCISE 9.3

Comparing (??) , Table ??

29. If A and G be A.M. and G.M., respectively between two positive numbers, prove that the numbers are $A \pm \sqrt{(A+G)(A-G)}$.

Ans.

$$(a, b) = A \pm \sqrt{A^2 - G^2} \quad (11)$$

$$\Rightarrow (a, b) = A \pm \sqrt{(A+G)(A-G)} \quad (12)$$

| Parameter | Value | Description |
|------------------|--------------------------|---------------|
| $x_1(n)$ | $(x_1(0) + nd)u(n)$ | AP series |
| $x_2(n)$ | $(x_2(0) \cdot r^n)u(n)$ | GP series |
| $x_1(0), x_2(0)$ | a | First number |
| $x_1(2), x_2(2)$ | b | Second number |
| $x_1(1)$ | $(x_1(0) + d)u(n)$ | A.M.(A) |
| $x_2(1)$ | $(x_1(0) \cdot r)u(n)$ | G.M.(B) |

TABLE I

INPUT PARAMETERS TABLE

From Table ??

$$x_1(2) = x_2(2) \quad (1)$$

$$(x_1(0) + 2d)u(n) = (x_1(0)r^2)u(n) \quad (2)$$

$$2d = x_1(0)(r^2 - 1) \quad (3)$$

Now the two numbers are

$$(a, b) = (x_1(0)u(n), (x_1(0) + d)u(n)) \quad (4)$$

$$= (x_1(0) + d \pm 2d)u(n) \quad (5)$$

$$= (x_1(0) + d \pm \sqrt{d^2})u(n) \quad (6)$$

$$= (x_1(0) + d)u(n) \pm \sqrt{2x_1(0)d - 2x_1(0)d + d^2}u(n) \quad (7)$$

Substituting (??) in (??):

$$(a, b) = (x_1(0) + d)u(n) \pm \sqrt{2x_1(0)d + x_1(0)x_1(0)(1 - r^2) + d^2}u(n) \quad (8)$$

$$= (x_1(0) + d)u(n) \pm \sqrt{x_1(0)^2 + d^2 + 2x_1(0)d - x_1(0)^2r^2}u(n) \quad (9)$$

$$= (x_1(0) + d)u(n) \pm \sqrt{((x_1(0) + d)u(n))^2 - ((x_1(0)r)u(n))^2} \quad (10)$$