

Discrete Assignment

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Question 11.9.5.15: The p th, q th and r th terms of an AP are a, b, c respectively. Show that

$$(q - r)a + (r - p)b + (p - q)c = 0$$

Solution:

The AP has the following parameters

| Term | Value | Description |
|--------|-------------|-------------------|
| $x(0)$ | - | First term |
| d | - | Common Difference |
| $x(n)$ | $x(0) + nd$ | General term |
| $x(p)$ | a | p th term |
| $x(q)$ | b | q th term |
| $x(r)$ | c | r th term |

TABLE 0
INPUT PARAMETERS

Now,

$$x(0) + pd = a \quad (1)$$

$$x(0) + qd = b \quad (2)$$

$$x(0) + rd = c \quad (3)$$

$$p - q = \frac{a - b}{d} \quad (4)$$

$$q - r = \frac{b - c}{d} \quad (5)$$

$$r - p = \frac{c - a}{d} \quad (6)$$

Now, from (4), (5) and (6),

$$(q - r)a + (r - p)b + (p - q)c = \frac{b - c}{d}.a + \frac{c - a}{d}.b + \frac{a - b}{d}.c \quad (7)$$

$$= 0$$

Hence proved