

Discrete Assignment

EE1205 Signals and Systems

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Question 11.9.5.15: The pth, qth and rth 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
$x(n - 1)$	$x(0) + nd$	General term

TABLE 0
INPUT PARAMETERS

Now,

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

$$x(q - 1) = x(0) + qd = b \quad (2)$$

$$x(r - 1) = x(0) + rd = c \quad (3)$$

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

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

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

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

$$(q - r)a + (r - p)b + (p - q)c = \frac{b - c}{d}.a + \frac{c - a}{d}.b + \frac{a - b}{d}.c = 0 \quad (7)$$

Hence proved