Discrete Assignment

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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
$x(n-1)$	$x(0)+(n-1)\,d$	General term
$x(p-1)$	a	pth term
$x(q-1)$	b	qth term
$x(r-1)$	c	rth term

TABLE 0
Input Parameters

Now,

$$x(p-1)=x(0)+(p-1)\,d=a \tag{1}$$
$$x(q-1)=x(0)+(q-1)\,d=b \tag{2}$$
$$x(r-1)=x(0)+(r-1)\,d=c \tag{3}$$
$$p-q=\frac{a-b}{d} \tag{4}$$
$$q-r=\frac{b-c}{d} \tag{5}$$
$$r-p=\frac{c-a}{d} \tag{6}$$

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

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

$$=0$$

Hence proved