Q:Two APs have the same common difference.The difference between their 100th terms is 100,what is the difference between their 1000th terms?

Solution:

$$x(n) = \{x(0) + nd\}u(n) \tag{1}$$
$$x(99) - y(99) = 100 \tag{2}$$
$$\implies (x(0) + 99d) - (y(0) + 99d) = 100 \tag{3}$$
$$\implies x(0) - y(0) = 100 \tag{4}$$

$$x(n) - y(n) = (x(0) + nd) - (y(0) + nd) \tag{5}$$
$$= x(0) - y(0) \tag{6}$$
$$= 100 \tag{7}$$

Variable	Description	Value
$x(n)$	n^{th} term of X	none
$y(n)$	n^{th} term of Y	none
d	common difference between the terms of AP	none
$x(n) - y(n)$	difference of n^{th} terms of X and Y	$x(99) - y(99) = 100$

TABLE 0
INPUT PARAMETERS

Let

$$x(n) = \{101, 106, 111, ...\} \tag{8}$$
$$y(n) = \{1, 6, 11, ...\} \tag{9}$$

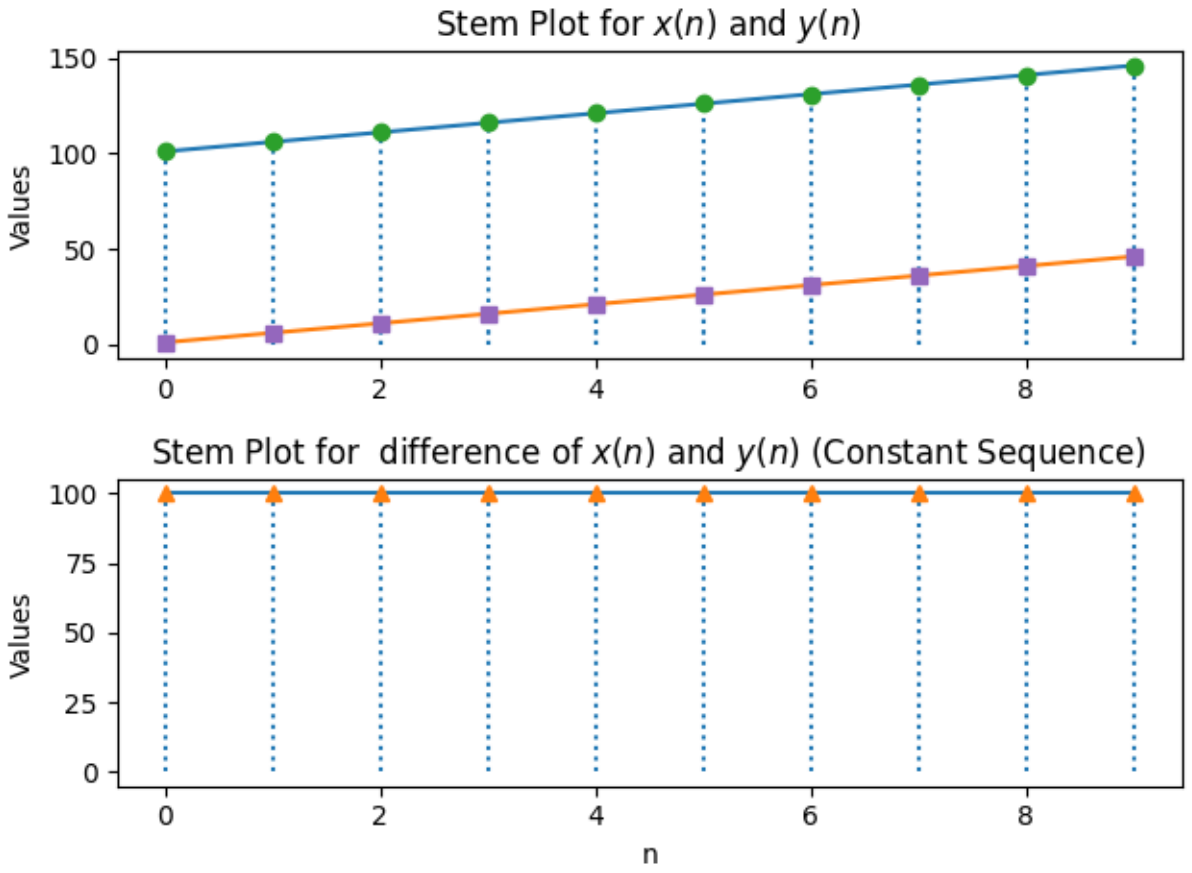
Stem Plot for $x(n)$ and $y(n)$
Values
150
100
50
0
0
2
4
6
8
Stem Plot for difference of $x(n)$ and $y(n)$ (Constant Sequence)
Values
100
75
50
25
0
0
2
4
6
8
n

Fig. 0.