Exercise 5.3

1 (ii) $\frac{1}{5}, \frac{3}{5}, \frac{5}{5}, \frac{7}{5}$

$a = \frac{1}{5}$

$a_2 - a_1 = \frac{3}{5} - \frac{-1}{5} = \frac{2}{5}$

$a_3 - a_2 = \frac{5}{5} - \frac{3}{5} = \frac{2}{5}$

$a_4 - a_3 = \frac{7}{5} - \frac{5}{5} = \frac{2}{5}$

$\therefore d = \boxed{\frac{2}{5}}$

(iii) $0.3, 0.55, 0.80, 1.05, \ldots$

$a = 0.3$

$a_2 - a_1 = 0.55 - 0.3 = 0.25$

$a_3 - a_2 = 0.80 - 0.55 = 0.25$

$a_4 - a_3 = 1.05 - 0.80 = 0.25$

$\therefore d = \boxed{0.25}$

(iv) $-1.1, -3.1, -5.1, -7.1, \ldots$

$a = -1.1$

$a_2 - a_1 = -3.1 + 1.1 = -2$

$a_3 - a_2 = -5.1 + 3.1 = -2$

$a_4 - a_3 = -7.1 + 5.1 = -2$

$\therefore d = \boxed{-2}$

Q. 2 (iii) $a = -1.5$

$d = 0.5$

$a_2 = a + d = -1.5 + 0.5$

$= -2$

$a_3 = a + 2d = -1.5 - 2(0.5)$

$= -2.5$

$a_4 = a + 3d = -1.5 - 3(0.5)$

$= -3$

$a_5 = a + 4d = -1.5 - 4(-0.5)$

$= -3.5$

$\therefore$ AP $= -1.5, -2, -2.5, -3, -3.5 \ldots$

3(iii) Divya deposited ₹1000 at compound interest at the rate of 10% p.a. The amount at the end of first year, second year, third year, ... and so on.

→ This does not form an AP.

4 (i) $1, -2, -5, -8 \ldots$

$a_2 - a_1 = -2 - 1 = -3$

$a_3 - a_2 = -5 + 2 = -3$

$a_4 - a_3 = -8 + 5 = -3$

$\therefore d = \boxed{-3}$

Next four terms –

$-11, -14, -17, -20$

(iii) $-1, \frac{1}{4}, \frac{3}{2}, \ldots$

$a_2 - a_1 = \frac{1}{4} + 1 = \frac{5}{4}$

$a_3 - a_2 = \frac{3}{2} - \frac{1}{4} = \frac{5}{4}$

$\therefore \boxed{d = \frac{5}{4}}$

Next four terms –

$\frac{11}{4}, 4, \frac{21}{4}, \frac{13}{2}$

Q.5 (i) 3, 6, 12, 24 ...

$a_2 - a_1 = 6 - 3 = 3$

$a_3 - a_2 = 12 - 6 = 6$

$a_4 - a_3 = 24 - 12 = 12$

$3 \neq 6 \neq 12$

As it has no common difference,

∴ It is not an AP.

(iii) $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}$ ...

$a_2 - a_1 = \frac{1}{4} - \frac{1}{2} = \frac{-1}{4}$

$a_3 - a_2 = \frac{1}{6} - \frac{1}{4} = \frac{-1}{12}$

$a_4 - a_3 = \frac{1}{8} - \frac{1}{6} = \frac{-1}{24}$

As it has no common difference,

∴ It is not an AP.

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Q. 5

(v) 3, 3, 3, 3 ...

$a_2 - a_1 = 3 - 3 = 0$

$a_3 - a_2 = 3 - 3 = 0$

$a_4 - a_3 = 3 - 3 = 0$

As the common difference is 0,

∴ It is an AP.

(vii) 1.0, 1.7, 2.4, 3.1, ...

$a_2 - a_1 = 1.7 - 1.0 = 0.7$

$a_3 - a_2 = 2.4 - 1.7 = 0.7$

$a_4 - a_3 = 3.1 - 2.4 = 0.7$

As the common difference is 0.7,

∴ It is an AP.

(ix) $10, 10+2^5, 10+2^6, 10+2^7, \ldots$

$a_2 - a_1 = 10 + 2^5 - 10 = 32$

$a_3 - a_2 = 10 + 2^6 - 10 - 2^5 = 64 - 32 = 32$

$a_4 - a_3 = 10 + 2^7 - 10 - 2^6 = 128 - 64 = 64$

As it has no common difference,

∴ It is not an AP.

(xi) $1^2, 3^2, 5^2, 7^2$

$a_2 - a_1 = 3^2 - 1^2 = 8$

$a_3 - a_2 = 5^2 - 3^2 = 16$

$a_4 - a_3 = 7^2 - 5^2 = 24$

As it has no common difference,

∴ It is not an AP.

Q. 6 (i) 51, 59, 67, 75, ...

$a_2 - a_1 = 59 - 51 = 8$

$a_3 - a_2 = 67 - 59 = 8$

$a_4 - a_3 = 75 - 67 = 8$

As the common difference is 8,

∴ It is an AP

Next two terms :-

83, 91

(iii) 1.8, 2.0, 2.2, 2.4, ...

$a_2 - a_1 = 2 - 1.8 = 0.2$

$a_3 - a_2 = 2.2 - 2 = 0.2$

$a_4 - a_3 = 2.4 - 2.2 = 0.2$

As the common difference is 0.2,

∴ It is an AP.

Next two terms -

2.6, 2.8

(v) 119, 136, 153, 170, ...

$a_2 - a_1 = 136 - 119 = 17$

$a_3 - a_2 = 153 - 136 = 17$

$a_4 - a_3 = 170 - 153 = 17$

As the common difference is 17,

∴ It is an AP.

Next two terms -

187, 204.

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Q.7 $a_n = a + nb$ (Given)

Let $n = 1, 2, 3, 4, 5 \ldots$

$a_1 = a + b$

$a_2 = a + 2b$

$a_3 = a + 3b$

$a_4 = a + 4b$

$a_5 = a + 5b$

$a_2 - a_1 = a + 2b - a - b = b$

$a_3 - a_2 = a + 3b - a - 2b = b$

$a_4 - a_3 = a + 4b - a - 3b = b$

$a_5 - a_4 = a + 5b - a - 4b = b$

∴ The common difference is b.