

Mathematics

Tasks

12/08/2023

12.08.

Arithmetic / Geometric Progressions

$$N^0 = 2, 10$$

2. ~~Да~~ Нет, так как каждое последующее число имеет одинаковую разницу с предыдущим, кроме 10 и 12 где разность 2.

$$10. \quad 18/9 = 3$$

$$a_5 = a_1 + 4d$$

$$a_2 = a_1 + d$$

$$a_5 - a_2 = a_1 + 4d - a_1 - d = 3d$$

$$18 - 9 = 3d$$

$$d = 9/3$$

$$d = 3$$

$$N = 5, 11$$

$$a_1 = 15; a_1 + a_2 + a_3 = 102$$

$$a_2 = a_1 + d$$

$$a_3 = a_1 + 2d$$

$$x = a_1 + a_1 + d + a_1 + 2d$$

$$x = 3a_1 + 3d$$

$$3a_1 + 3d = 102$$

$$3 \cdot 15 + 3d = 102$$

$$45 + 3d = 102$$

$$3d = 57$$

$$d = 57 / 3$$

$$d = 19$$

~~$$a_1 + a_2 + a_3 + \dots$$~~

$$a_{10} = a_1 + 9d = 15 + 9 \cdot 19 = 186$$

$$a_{10} = a_5 + 5 \cdot d$$

$$5 + 5d = 15$$

$$5d = 15 - 5$$

$$d = 2$$

$$a_5 = a_1 + 4d$$

$$a_5 = a_1 + 8$$

$$-a_1 = 8 - 5$$

$$-a_1 = 3, \quad a_1 = -3$$

$$3. \quad a_1 = 5, \quad a_3 > 20; \quad q = ?$$

$$a_3 = a_1 \cdot 2q^2$$

$$a_3 = 5 \cdot 2q^2$$

$$5 \cdot 2q^2 = 20$$

$$2q = 20/5$$

$$2q = 4$$

$$q = 2$$

$$d = 2$$

$$5 \cdot 2 = 10 (a_2)$$

$$10 \cdot 2 = 20 (a_3)$$

$$N^0 = 3, 12$$

$$3. \quad b_1 = 2; \quad q = -2$$

$$b_{10} = b_1 \cdot q^{n-1}$$

$$b_{10} = b_1 \cdot q^9 = 2 \cdot 2^9 = 2 \cdot 512 = 1024$$

$$S_n = \frac{b_1 (1 - q^n)}{1 - q} = \frac{2 \cdot (1 - 1024)}{1 - (-2)} = \frac{2 \cdot (-1023)}{3}$$

$$S_{10} = -682$$

$$0 \cdot -682$$

$$b_1 = 5; \quad b_3 = 20$$

$$b_3 = b_1 \cdot q^{(3-1)}$$

$$b_3 = 5 \cdot q^2 = 20$$

$$q^2 = \frac{20}{5}$$

$$q^2 = 4$$

$$q = 2 \quad \text{или} \quad q = -2$$

$$12. S_4 = \frac{a_1 + \dots + 1 - q^n}{1 - q}$$

$$40 = \frac{1 \cdot (1 - q^4)}{1 - q}$$

$$40(1 - q) = 1 - q^4$$

$$40 - 40q = 1 - q^4$$

$$q^4 - 40q + 39 = 0$$

$$q^4 - q - 39q + 39 = q(q^3 - 1) - 39(q - 1) =$$

$$= q(q - 1)(q^2 + q + 1) - 39(q - 1) =$$

$$= (q - 1)(q^3 + q^2 + q - 39)$$

$$q^3 + q^2 + q - 39 = 0$$

$$q^3 - 27 + q^2 - 9 + q - 3 = 0$$

$$3^3 = 27 \quad 3^2 = 9 \quad 3 = 3$$

$$(q^3 - 27)(q^2 + 3q + 9) + (q - 3) = 0$$

$$(q - 3)(q^2 + 3q + 9) + (q - 3) = 0$$

$$q^3 - 27 + q^2 - 9 + q - 3 = 0$$

$$(q-3)(q^2 + 3q + 9) + (q-3)(q+3) + 11(q-3) = 0$$

$$(q-3)(q^2 + 3q + 3 + q + 3 + 11) = 0$$

$$(q-3)(q^2 + 4q + 7) = 0$$

$$q^2 + 4q + 7 = (q+2)^2 + 3, \text{ no real roots}$$

$$7 \cdot a_n = 6 \cdot \left(\frac{1}{3}\right)^n$$

$$S = \frac{a_1}{1-q}$$

$$a_1 = 6 \cdot \frac{1}{3}; q = \frac{1}{3}$$

$$S = 6 \cdot \frac{1}{3} \cdot \frac{1}{1-\frac{1}{3}} = \frac{6}{3} \cdot \frac{1}{\frac{2}{3}} =$$

$$= \frac{6}{3 - \frac{1}{3}} = \frac{6}{2} = 3$$

$$x_1 x_2 \rightarrow x^2 - 3x + 2 = 0$$

$$x_1 + x_2 = -\frac{-3}{1} = 3$$

$$x_1 + x_2 = 1$$

$$3 \cdot \frac{1}{3} = \frac{3}{3} = 1, \text{ то } 3 + \frac{1}{3} = 3\frac{1}{3}$$

законч эти числа не подходят как корни уравнения

$$D = 1 - 3^2 - 4 \cdot 1 = 9 - 4 = 5$$

$$x_{1,2} = \left| \frac{3 \pm \sqrt{5}}{2} \right|$$

$$42. \quad S_{\infty} = \frac{b_1}{1-q}$$

$$S = \frac{1}{1 - \frac{1}{7}} = \frac{1}{\frac{6}{7}} = 1 \cdot \frac{7}{6} = \frac{7}{6}$$

$$1 + 2x + 3x^2 + 4x^3 + 5x^4 + \dots \quad |x| < 1$$

$$S = 1 + 2x + 3x^2 + 4x^3 + 5x^4 = 1 + 1/(1+x+x^2)$$