Bellwork Alg 2 Wednesday, September 18, 2019

a) State if it is Arithmetic, Geometric, or Neither b) State the next four terms

1. $12, 22, 42, 72, \ldots$

2. $262440, 174960, 116640, 77760 \ldots$

3. $100, 102, 98, 106, 90, \ldots$

4. $84, 82.8, 81.6, 80.4, 79.2, \ldots$

Use each formula to find the first 6 terms in the sequence.

5. $f(0) = -1 \quad f(1) = 4 \quad f(n) = f(n-2) - 2f(n-1)$

6. $t_n = -64\left(\frac{3}{2}\right)^{n-1}$

7. Write a recursive and explicit formula for each sequence.

a) $15, 2, -11, -24, \ldots$ b) $1215, -405, 135, -45, 15, \ldots$

8. Write each series in Sigma Notation.

a) $7 + 28 + 112 + 448 + 1792 + \ldots + 458752$ b) $9 + 21 + 33 + 45 + 57 + \ldots + 165$

9. Find each sum, if it exists. Round to the nearest thousandth if necessary.

a) $\sum_{n=1}^{11} -71 + 6(n-1)$ b) $\sum_{n=1}^{\infty} 11\left(\frac{3}{4}\right)^{n-1}$

c) $240 + 360 + 540 + 810 + \ldots$ d) $4802 + 686 + 98 + \ldots + \frac{2}{49}$ e) $78 + 65 + 52 + 39 + \ldots + -91$

10. A business has an income of $120,000 its first year. Each of the following years their income increases by 10%.

a) Write a formula for their total income for the first 8 years.

b) Find this total income.

11. The first term of an arithmetic sequence is 18 and the 14th term is 239. Write the general (explicit) formula for this sequence.

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ANSWERS

a) State if it is Arithmetic, Geometric, or Neither b) State the next four terms

1. $12, 22, 42, 72, \ldots$ (+10, +20, +30) add next mult. of 10

a) Neither

b) 112, 162, 222, 292

2. $262440, 174960, 116640, 77760 \ldots$ mult by 2/3

a) Geometric

b) 51840, 34560, 23040, 15360

3. $100, 102, 98, 106, 90, \ldots$ (+2, −4, +8, −16) ALTERNATE +/− NEXT POWER OF 2

a) Neither

b) 122, 58, 186, −70

4. $84, 82.8, 81.6, 80.4, 79.2, \ldots$ SUBTRACT 1.2 → AOD −1.2

a) Arithmetic

b) 78, 76.8, 75.6, 74.4

Use each formula to find the first 6 terms in the sequence.

5. $f(0) = -1 \quad f(1) = 4 \quad f(n) = f(n-2) - 2f(n-1)$

$\frac{-1}{t_1}, \frac{4}{t_2}, \frac{-9}{t_3}, \frac{22}{t_4}, \frac{-53}{t_5}, \frac{128}{t_6}$

$t_3 = t_1 - 2t_2 = -1 - 2(4) = -9$

$t_4 = t_2 - 2t_3 = 4 - 2(-9) = 22$

$t_5 = t_3 - 2t_4 = -9 - 2(22) = -53$

$t_6 = t_4 - 2t_5 = 22 - 2(-53) = 128$

6. $t_n = -64\left(\frac{3}{2}\right)^{n-1}$

$\frac{-64}{t_1}, \frac{-96}{t_2}, \frac{-144}{t_3}, \frac{-216}{t_4}, \frac{-324}{t_5}, \frac{-486}{t_6}$

7. Write a recursive and explicit formula for each sequence.

a) $15, 2, -11, -24, \ldots$ (−13, −13, −13) ARITHMETIC $d = -13$

Recursive: $t_1 = 15$, $t_n = t_{n-1} - 13$

Explicit: $t_n = 15 - 13(n-1)$

b) $1215, -405, 135, -45, 15, \ldots$ Geometric $r = -1/3$

Recursive: $t_1 = 1215$, $t_n = (t_{n-1})(-1/3)$

Explicit: $t_n = 1215(-1/3)^{n-1}$

8. Write each series in Sigma Notation.

a) $7 + 28 + 112 + 448 + 1792 + \ldots + 458752$ (7168 + 28672 + 114688)

Geometric $r = 4$ 9 terms

$\sum_{n=1}^{9} 7(4)^{n-1}$

b) $9 + 21 + 33 + 45 + 57 + \ldots + 165$

ARITHMETIC $d = 12$

$165 = 9 + d2(n-1)$

$156 = 12(n-1)$

$13 = n - 1$

$n = 14$

$\sum_{n=1}^{14} 9 + 12(n-1)$

9. Find each sum, if it exists. Round to the nearest thousandth if necessary.

a) $\sum_{n=1}^{11} -71 + 6(n-1)$

FINITE ARITHMETIC

$n = 11 \quad t_1 = -71$

$t_{11} = -71 + 6(11-1) = -11$

$S_{11} = \frac{11}{2}(-71 + -11)$

$S_{11} = 5.5(-82)$

$S_{11} = -451$

b) $\sum_{n=1}^{\infty} 11\left(\frac{3}{4}\right)^{n-1}$

INFINITE GEO $r = 3/4 \quad t_1 = 11$

$S = \frac{11}{1 - 3/4} = 44$

c) $240 + 360 + 540 + 810 + \ldots$

INFINITE GEO

$r = 1.5$

NO SUM

d) $4802 + 686 + 98 + \ldots + \frac{2}{49}$ (+14 + 2 + 2/7)

FINITE GEO $r = \frac{1}{7}$

$t_1 = 4802$

$n = 7$

$S_7 = 4802\left(\frac{1 - \frac{1}{7}^7}{1 - 1/7}\right)$

$= 5602.327$

$= 5602\ 16/49$

e) $78 + 65 + 52 + 39 + \ldots + -91$

FINITE ARITH $d = -13$

$t_1 = 78 \quad t_n = -91$

$-91 = 78 - 13(n-1)$

$-169 = -13(n-1)$

$13 = n - 1$

$n = 14$

$S_{14} = \frac{14}{2}(78 + -91)$

$= 7(-13)$

$= -91$

10. A business has an income of \$120,000 its first year. Each of the following years their income increases by 10%. $120{,}000(1.10)^{n-1}$

a) Write a formula for their total income for the first 8 years. GEO $r = 1.10$

$$\sum_{n=1}^{8} 120{,}000\,(1.10)^{n-1}$$

b) Find this total income.

$t_1 = 120{,}000$

$r = 1.10$

$n = 8$

$S_8 = t_1\left(\frac{1-r^n}{1-r}\right) = 120{,}000\left(\frac{1 - 1.10^8}{1 - 1.10}\right)$

$= \$1{,}372{,}306.57$

11. The first term of an arithmetic sequence is 18 and the 14th term is 239. Write the general (explicit) formula for this sequence.

$t_1 = 18 \qquad t_{14} = 239$

$t_n = t_1 + d(n-1)$

$239 = 18 + d(14-1)$

$221 = d(13)$

$d = 17$

Explicit Formula

$t_n = 18 + 17(n-1)$