

Write the first four terms of the sequence defined recursively by $a_n = n - 2a_{n-1}$, $a_1 = -1$.

SCORE: ____ / 4 PTS

Write your final answer as a list.

$$a_2 = 2 - 2a_1 = 2 - 2(-1) = 4$$

$$a_3 = 3 - 2a_2 = 3 - 2(4) = -5$$

$$a_4 = 4 - 2a_3 = 4 - 2(-5) = 14$$

$$-1, 4, -5, 14$$

① ① ①

+ ① POINT FOR WRITING AS A LIST WITH -1 AT THE FRONT

Simplify the factorial expression $\frac{(4n-2)!}{(4n+1)!}$. You may leave your final answer in a factored form.

SCORE: ____ / 4 PTS

$$\frac{(4n-2)!}{(4n+1)4n(4n-1)(4n-2)!} = \frac{1}{4n(4n+1)(4n-1)}$$

→ ②

②

OK IF YOU WROTE AS $\frac{(4n-2)(4n-3)(4n-4) \dots 3 \cdot 2 \cdot 1}{(4n+1)4n(4n-1)(4n-2)(4n-3) \dots 3 \cdot 2 \cdot 1}$

Use sigma notation to write the series $\frac{4}{4} + \frac{7}{9} + \frac{10}{16} + \frac{13}{25} + \dots + \frac{25}{81}$. ← ARITHMETIC $d=3$

SCORE: ____ / 5 PTS

$$\sum_{n=1}^8 \frac{4+3(n-1)}{(n+1)^2} = \sum_{n=\frac{1}{2}}^8 \frac{3n+1}{(n+1)^2}$$

TALK TO ME IF YOUR LOWER LIMIT WAS NOT $n=1$

The clearance store had a sofa on sale for \$900. For 9 weeks, the sofa did not get sold, and each week, the store reduced the price by 4% of its price the previous week. Let a_n be the price of the sofa during the n -th week that it was on sale. SCORE: ____ / 3 PTS

[a] Is the sequence $a_1, a_2, a_3, \dots, a_n$ arithmetic, geometric or neither?

GEOMETRIC ① ②

[b] If the sequence is arithmetic, find the common difference.
If the sequence is geometric, find the common ratio.
If the sequence is neither, show how you arrived at that conclusion.

$$r = 1 - .04 = .96 \quad ① ②$$

Find the sum $\sum_{n=2}^6 (-1)^{n+1} (7-2n)$. Show clearly the terms being added together.

SCORE: ____ / 3 PTS

$$\begin{array}{ccccccc} -3 & + & 1 & + & 1 & - & 3 & + & 5 & = & 1 \\ \textcircled{\frac{1}{2}} & & \textcircled{\frac{1}{2}} & & \textcircled{\frac{1}{2}} & & \textcircled{\frac{1}{2}} & & \textcircled{\frac{1}{2}} & & \textcircled{1} \end{array}$$

Find the general formula and the 12th term of the geometric sequence with $a_2 = 750$ and $a_5 = 162$.

SCORE: ____ / 5 PTS

Round all calculations to 4 decimal places.

$$\begin{array}{l} a_2 = a, r = 750 \\ a_5 = a, r^4 = 162 \end{array} \quad \begin{array}{l} \nearrow \\ \text{DIVIDE} \end{array}$$

$$r^3 = 0.216 \quad \textcircled{1}$$

$$r = \sqrt[3]{0.216} = 0.6 \rightarrow 0.6a_1 = 750$$

$$\quad \quad \quad \textcircled{1} \quad \quad \quad \underline{a_1 = 1250} \quad \textcircled{1}$$

$$a_n = 1250(0.6)^{n-1} \quad \textcircled{1}$$

$$a_{12} = 1250(0.6)^{11}$$

$$\approx 4.5350 \quad \textcircled{1}$$

$\textcircled{\frac{1}{2}}$ POINT IF YOU STOPPED AT $1250(0.6)^{11}$

Find the sum of the first 100 terms of the arithmetic sequence with $a_{10} = 31$ and $a_{22} = 23$.

SCORE: ____ / 6 PTS

Use fractions, NOT decimals, for all work.

$$\begin{array}{l} a_{10} = a + 9d = 31 \\ a_{22} = a + 21d = 23 \end{array} \quad \begin{array}{l} \nearrow \\ \text{SUBTRACT} \end{array}$$

$$12d = -8 \quad \textcircled{1}$$

$$d = -\frac{2}{3} \rightarrow a_1 - 6 = 31$$

$$\quad \quad \quad \textcircled{1} \quad \quad \quad \underline{a_1 = 37} \quad \textcircled{1}$$

$$S_{100} = \frac{100}{2} (2(37) + (100-1)(-\frac{2}{3})) \quad \text{OR} \quad a_{100} = 37 + 99(-\frac{2}{3}) = -29$$

$$= 400 \quad \textcircled{1} \quad \quad \quad \textcircled{2} \quad \text{OR} \quad S_{100} = \frac{100}{2} (37 - 29) = 400$$

Find parametric equations for the ellipse with foci (3, 5) and (3, 1), and vertices (3, 7) and (3, -1).

SCORE: ____ / 5 PTS

$$\text{CENTER} = (3, 3)$$

$$a = 7 - 3 = 4$$

$$c = 5 - 3 = 2$$

$$a^2 = b^2 + c^2$$

$$16 = b^2 + 4 \rightarrow b^2 = 12 \rightarrow b = 2\sqrt{3}$$



$$\begin{array}{l} \textcircled{\frac{1}{2}} x = 3 + 2\sqrt{3} \cos t \quad \textcircled{\frac{1}{2}} \\ \textcircled{\frac{1}{2}} y = 3 + 4 \sin t \quad \textcircled{\frac{1}{2}} \end{array}$$