

Find the 5th term of the sequence defined recursively by $a_1 = 3$, $a_2 = 2$, $a_{n+1} = (n-2)a_n - 3a_{n-1}$ for $n \geq 2$. SCORE: _____ / 3 PTS

$$n=2 \quad a_3 = 0a_2 - 3a_1 = 0(2) - 3(3) = \underline{-9} \textcircled{1}$$

$$n=3 \quad a_4 = 1a_3 - 3a_2 = 1(-9) - 3(2) = \underline{-15} \textcircled{1}$$

$$n=4 \quad a_5 = 2a_4 - 3a_3 = 2(-15) - 3(-9) = \underline{-3} \textcircled{1}$$

Consider the arithmetic sequence with $a_{10} = 6$ and $a_{14} = -1$.

SCORE: ____ / 7 PTS

[a] Find the formula for a_n .

$$\begin{aligned} a_{10} &= a_1 + 9d = 6 \\ a_{14} &= a_1 + 13d = -1 \end{aligned} \quad \begin{array}{c} \uparrow \\ \text{SUBTRACT} \end{array}$$

$$4d = -7 \quad (1)$$

$$d = -\frac{7}{4} \text{ or } -1.75 \quad (\frac{1}{2})$$

$$a_1 + 9(-\frac{7}{4}) = 6$$

$$a_1 - \frac{63}{4} = 6 \quad (1)$$

$$a_1 = \frac{87}{4} \text{ or } 21.75 \quad (\frac{1}{2})$$

$$a_n = \frac{87}{4} - \frac{7}{4}(n-1)$$

$$\text{or } 21.75 - 1.75(n-1)$$

(1/2)

[b] Find the sum of the first 200 terms of the sequence above.

$$S_{200} = \frac{200}{2} \left(2 \cdot \frac{87}{4} + 199 \cdot -\frac{7}{4} \right) = 100 \left(\frac{87}{2} - \frac{1393}{4} \right)$$

(2)

$$= 100 \cdot \frac{-1219}{4} = -30475$$

(1/2)

Simplify $\frac{(p-6)!}{(p-4)!}$. **NOTE: Your final answer can be in factored form.**

SCORE: _____ / 3 PTS

$$\frac{\cancel{(p-6)!}}{(p-4)(p-5)\cancel{(p-6)!}} = \frac{1}{(p-4)(p-5)}$$

② ①

Write $\frac{7^2}{49} - \frac{8^2}{64} + \frac{9^2}{81} - \frac{10^2}{100} + \frac{11^2}{121} - \frac{12^2}{144} + \frac{13^2}{169}$ using sigma notation.

$$n = 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7$$

OTHER SOLUTIONS

POSSIBLE -

TALK TO ME

SCORE: ____ / 4 PTS

DENOMINATOR = ARITHMETIC SEQUENCE $a_1 = 5, d = 6$

START WITH $n = 1$

TO USE ARITHMETIC SEQUENCE
TEMPLATE

$$\textcircled{\frac{1}{2}} \left[\sum_{n=1}^7 (-1)^{n+1} \frac{(n+6)^2}{5+6(n-1)} \right] \textcircled{1}$$

SUBTRACT $\textcircled{\frac{1}{2}}$ POINT
IF YOU USED A DIFFERENT LETTER
UNDER THE Σ THAN INSIDE THE FORMULA

Find the sum of the series $\frac{5}{4} - \frac{1}{2} + \frac{1}{5} - \frac{2}{25} + \dots$. NOTE: Write your final answer as a simplified fraction. SCORE: ____ / 4 PTS

$$\frac{-\frac{1}{2}}{\frac{5}{4}} = -\frac{1}{2} \cdot \frac{4}{5} = \boxed{-\frac{2}{5}}$$

①

$$-\frac{1}{2} \cdot -\frac{2}{5} = \frac{1}{5}$$

$$\frac{1}{5} \cdot -\frac{2}{5} = -\frac{2}{25}$$

$$S = \boxed{\frac{\frac{5}{4}}{1 - \frac{-2}{5}}} = \frac{\frac{5}{4}}{\frac{7}{5}} = \frac{5}{4} \cdot \frac{5}{7} = \boxed{\frac{25}{28}}$$

②

①

INFINITE GEOMETRIC SERIES

Find the value of $\sum_{k=2}^5 (10k - (k+1)!)$.

SCORE: ____ / 5 PTS

$$= (20 - 3!) + (30 - 4!) + (40 - 5!) + (50 - 6!)$$

$$= (20 - 6) + (30 - 24) + (40 - 120) + (50 - 720)$$

$$= \underline{14} \textcircled{1} + \underline{6} \textcircled{1} + \underline{-80} \textcircled{1} + \underline{-670} \textcircled{1}$$

$$= \underline{-730} \textcircled{1}$$

You begin your first big job, and instead of saving for retirement immediately, you start buying stylish shoes. **SCORE: ____ / 4 PTS**

On your 21st birthday, you charge \$183 on your credit card. Each month after that, you charge 7% more than you charged the previous month. How much will you have charged altogether up to and including your 23rd birthday?

$$183 + 183(1.07) + 183(1.07)^2 + \dots + 183(1.07)^{24} \quad 24 - 0 + 1 = 25 \text{ TERMS}$$

$$S_{25} = \boxed{\frac{183(1.07^{25} - 1)}{1.07 - 1}} = \frac{183(1.07^{25} - 1)}{0.07} = \boxed{\frac{18300(1.07^{25} - 1)}{7}} \text{ or } \$11574.57$$

② ①