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 $a_1, a_2, a_3, \cdots, a_n$ arithmetic, geometric or neither ?

GEOMETRIC (1 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.

$r = 1 - .04 = .96$ (1 1/2)

Use sigma notation to write the series $\frac{9}{7}+\frac{16}{10}+\frac{25}{13}+\frac{36}{16}+\cdots+\frac{100}{28}$. ← ARITHMETIC $d=3$ **SCORE: ____ / 5 PTS**

$3^2 \quad 4^2 \quad 5^2 \quad 6^2 \qquad 10^2$

$n=1 \quad 2 \quad 3 \quad 4 \qquad 8$

$$\sum_{n=1}^{8} \frac{(n+2)^2}{7+3(n-1)} = \sum_{n=1}^{8} \frac{(n+2)^2}{3n+4}$$

(1/2) (1) (1) (2) (1/2)

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

Write the first four terms of the sequence defined recursively by $a_n = n - 2a_{n-1}$, $a_1 = -2$. **SCORE: ____ / 4 PTS**

Write your final answer as a list.

$a_2 = 2 - 2a_1 = 2 - 2(-2) = 6$

$a_3 = 3 - 2a_2 = 3 - 2(6) = -9$

$a_4 = 4 - 2a_3 = 4 - 2(-9) = 22$

$-2, 6, -9, 22$

(1) (1) (1)

+(1) POINT FOR WRITING AS A LIST WITH -2 AT THE FRONT

Simplify the factorial expression $\frac{(5n-1)!}{(5n+2)!}$. **You may leave your final answer in a factored form.** **SCORE: ____ / 4 PTS**

$$\frac{(5n-1)!}{(5n+2)(5n+1)5n(5n-1)!} = \frac{1}{5n(5n+1)(5n+2)}$$

(2) (2)

OK IF YOU WROTE AS $\frac{(5n-1)(5n-2)(5n-3)\cdots 3\cdot 2\cdot 1}{(5n+2)(5n+1)5n(5n-1)(5n-2)\cdots 3\cdot 2\cdot 1}$

Find parametric equations for the ellipse with foci $(3, 5)$ and $(3, 1)$, and vertices $(3, 7)$ and $(3, -1)$. **SCORE: ____ / 5 PTS**

CENTER $= (3,3)$

$a = 7-3 = 4$

$c = 5-3 = 2$

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

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

$x = 3 + 2\sqrt{3}\cos t$

$y = 3 + 4\sin t$

Find the sum of the first 100 terms of the arithmetic sequence with $a_9 = 31$ and $a_{21} = 22$. **SCORE: ____ / 6 PTS**

Use fractions, NOT decimals, for all work.

$a_9 = a_1 + 8d = 31$

$a_{21} = a_1 + 20d = 22$ } SUBTRACT

$12d = -9$

$d = -\frac{3}{4} \rightarrow a_1 - 6 = 31$

$a_1 = 37$

$S_{100} = \frac{100}{2}\left(2(37) + (100-1)\left(-\frac{3}{4}\right)\right)$

$= -12\frac{1}{2}$

OR $a_{100} = 37 + 99\left(-\frac{3}{4}\right) = -37\frac{1}{4}$

$S_{100} = \frac{100}{2}\left(37 + -37\frac{1}{4}\right)$

Find the sum $\sum_{n=3}^{7}(-1)^{n+1}(13-2n)$. **Show clearly the terms being added together.** **SCORE: ____ / 3 PTS**

$7 - 5 + 3 - 1 - 1 = 3$

Find the general formula and the 12^{th} term of the geometric sequence with $a_2 = 750$ and $a_5 = 162$. **SCORE: ____ / 5 PTS**

Round all calculations to 4 decimal places.

$a_2 = a_1 r = 750$

$a_5 = a_1 r^4 = 162$ } DIVIDE

$r^3 = 0.216$

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

$a_1 = 1250$

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

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

≈ 4.5350

(½) POINT IF YOU STOPPED AT $1250(0.6)^{11}$