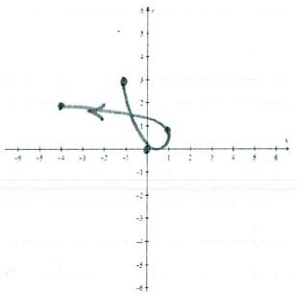
Sketch the curve represented by the parametric equations $x = 2t - t^3$, $y = 2|t| - t$ for $-1 \le t \le 2$. **SCORE: ____ / 4 PTS**

Indicate the orientation (direction) of the curve.

t	x	y
-1	-1	3
0	0	0
1	1	1
2	-4	2

GRADED BY ME



Write $\frac{2}{8} - \frac{6}{27} + \frac{18}{64} - \frac{54}{125} + \frac{162}{216} - \frac{486}{343} + \frac{1458}{512}$ in sigma notation. **SCORE: ____ / 4 PTS**

GEOMETRIC, $r = 3$

ALTERNATING

PERFECT CUBES $2^3, 3^3, \ldots$

$\sum_{n=1}^{7} \frac{(-1)^{n+1} 2(3)^{n-1}}{(n+1)^3}$ (½ ½ ½ ½ 1 1)

OR $\sum_{n=2}^{8} \frac{(-1)^n 2(3)^{n-2}}{n^3}$ (½ ½ ½ ½ 1 1)

GRADE AGAINST ONE VERSION ONLY

SUBTRACT ½ POINT IF INDEX UNDER Σ DOESN'T MATCH INDEX INSIDE FORMULA

Find parametric equations for the hyperbola with vertices $(\pm 7, 0)$ and foci $(\pm 9, 0)$. **SCORE: ____ / 3 PTS**

$9^2 = 7^2 + b^2$

$32 = b^2$

$b = 4\sqrt{2}$

(½) $x = 7\sec t$

(1) $y = 4\sqrt{2}\tan t$ (1½)

Prove the formula for the sum of the first n terms of a finite geometric series as shown in lecture. **SCORE: ____ / 5 PTS**

$S_n = a_1 + a_1 r + a_1 r^2 + \cdots + a_1 r^{n-3} + a_1 r^{n-2} + a_1 r^{n-1}$ (½)

$rS_n = a_1 r + a_1 r^2 + a_1 r^3 + \cdots + a_1 r^{n-2} + a_1 r^{n-1} + a_1 r^n$ (1½)

$S_n - rS_n = a_1 - a_1 r^n$ (1½)

$(1-r)S_n = a_1(1-r^n)$ (1)

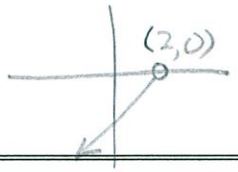
$S_n = \frac{a_1(1-r^n)}{1-r}$ (½)

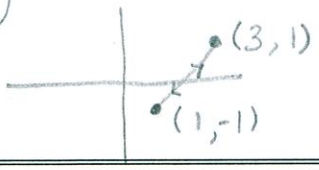
The parametric equations $\begin{matrix} x = 2 - e^t \\ y = -e^t \end{matrix}$ and $\begin{matrix} x = \sin t + 2 \\ y = \sin t \end{matrix}$ both correspond to the rectangular equation $y = x - 2$. **SCORE: ____ / 3 PTS**

Explain how the parametric curves differ from each other. **Be as specific as possible.**

GRADED BY ME

AS t GOES FROM $-\infty$ TO ∞, $y = -e^t$ GOES FROM ≈ 0 TO $-\infty$ AND $y = \sin t$ OSCILLATES BETWEEN -1 AND 1





Find the sum of the infinite series $243 - 162 + 108 - 72 + 48 - \cdots$. GEOMETRIC, $r = \frac{-162}{243} = -\frac{2}{3}$ **SCORE: ____ / 2 PTS**

$S = \frac{243}{1-(-\frac{2}{3})}$ (1½) $= \frac{243}{\frac{5}{3}} = 243 \times \frac{3}{5} = \frac{729}{5}$ (½)

Find parametric equations for the line through the points $(5, -4)$ and $(-2, -1)$. **SCORE: ____ / 2 PTS**

$x = 5 + (-2-5)t \rightarrow x = 5 - 7t$ (1)

$y = -4 + (-1-4)t \rightarrow y = -4 + 3t$ (1)

To prepare for her son's college tuition, Chris opened a new savings account. **SCORE: ____ / 4 PTS**
The first month, she added $\$327$ into the account. Every month after that, she added $\$19$ more than she had added the previous month.

[a] After 13 years, how much had Chris added to the account altogether ?

ARITHMETIC, $d = 19$ 13 YEARS = 156 MONTHS

$S_{156} = \frac{1}{2}(156)(2(327) + (156-1)(19)) = \$280,722$ (½) (1)

[b] How much did Chris add to the account in month 94 ?

$a_{94} = 327 + (94-1)(19) = \$2,094$ (1) (½)

Eliminate the parameter and write the rectangular equation for the curve represented by the parametric equations $\begin{matrix} x = e^{3t} \\ y = 54t^3 \end{matrix}$. **SCORE: ____ / 3 PTS**

Write your final answer in the form y as a simplified function of x.

$\ln x = 3t$

$t = \frac{1}{3}\ln x$ (1)

$y = 54\left(\frac{1}{3}\ln x\right)^3$ (1)

$y = 54\left(\frac{1}{27}(\ln x)^3\right)$

$y = 2(\ln x)^3$ (1)