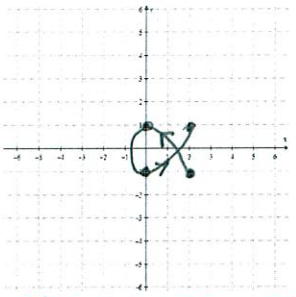
Sketch the curve represented by the parametric equations $\begin{aligned} x &= t^2 + t \\ y &= -\cos \pi t \end{aligned}$ for $-2 \le t \le 1$ **SCORE: ____ / 4 PTS**

by plotting at least *4* points. Indicate the orientation (direction) of the curve.

t	x	y	
-2	2	-1	$\frac{1}{2}$
-1	0	1	$\frac{1}{2}$
0	0	-1	$\frac{1}{2}$
1	2	1	$\frac{1}{2}$



GRADED BY ME

Find the value of $\sum_{n=2}^{5} [4n^2 - (n!)]$. **SCORE: ____ / 3 PTS**

$[4(2)^2 - 2!] + [4(3)^2 - 3!] + [4(4)^2 - 4!] + [4(5)^2 - 5!]$

$= (16 - 2) + (36 - 6) + (64 - 24) + (100 - 120)$

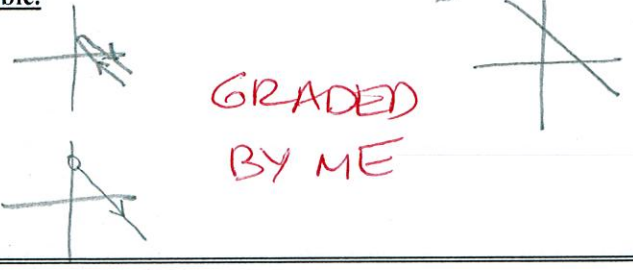
$= \underset{\frac{1}{2}}{14} + \underset{\frac{1}{2}}{30} + \underset{\frac{1}{2}}{40} + \underset{\frac{1}{2}}{-20} = \underset{1}{64}$

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

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

① x GOES FROM ∞ TO 0 TO ∞

② x GOES FROM ≈ 0 TO ∞



GRADED BY ME

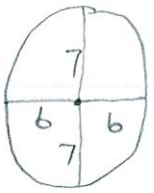
Simplify $\dfrac{(n-4)!}{(n-2)!}$. **SCORE: ____ / 3 PTS**

$\dfrac{(n-4)!}{(n-2)(n-3)(n-4)!} = \dfrac{1}{(n-2)(n-3)}$ OR $\dfrac{1}{n^2-5n+6}$ ($1\frac{1}{2}$ for each; EITHER ONE IS OK)

OR $\dfrac{(n-4)(n-5)(n-6)\cdots(1)}{(n-2)(n-3)(n-4)(n-5)(n-6)\cdots(1)}$ ($1\frac{1}{2}$)

EITHER ONE IS OK

Find parametric equations for the ellipse that has center $(4,-8)$, and is 12 units wide (side-to-side) and 14 units tall (top-to-bottom).



SCORE: _____ / 2 PTS

$x = 4 + 6\cos t$ (1)

$y = -8 + 7\sin t$ (1)

Eliminate the parameter and write the rectangular equation for the curve represented by the parametric equations $x = \dfrac{t}{1+t}$, $y = \dfrac{t}{2t-1}$. **Write your final answer in the form y as a simplified function of x.**

SCORE: _____ / 5 PTS

$x(1+t) = t$

$x + xt = t$ (1)

$x = t - xt$

$x = t(1-x)$ (1)

$t = \dfrac{x}{1-x}$ (1)

$y = \dfrac{\frac{x}{1-x}}{2\left(\frac{x}{1-x}\right)-1} \cdot \dfrac{1-x}{1-x}$ (1)

$= \dfrac{x}{2x-(1-x)}$

$= \dfrac{x}{3x-1}$ (1)

Write $\dfrac{8}{8} - \dfrac{16}{27} + \dfrac{32}{64} - \dfrac{64}{125} + \dfrac{128}{216} - \dfrac{256}{343}$ using sigma notation.

(2^3 2^4 2^5 2^6 2^7 2^8 / 2^3 3^3 4^3 5^3 6^3 7^3)

SCORE: _____ / 5 PTS

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

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

(1) POINT FOR USING SAME INDEX UNDER Σ AS IN FORMULA (IE. LETTER)

Find parametric equations for the line through the points $(6,-11)$ and $(-1,-7)$.

SCORE: _____ / 2 PTS

$x = 6 + (-1-6)t = 6 - 7t$ (1)

$y = -11 + (-7-(-11))t = -11 + 4t$ (1)

OR

$x = -1 + (6-(-1))t = -1 + 7t$

$y = -7 + (-11-(-7))t = -7 - 4t$

Find the 4^{th} term of the sequence defined recursively by $a_1 = -2$, $a_n = n^2 - 2a_{n-1}$ for $n \geq 2$.

SCORE: _____ / 3 PTS

$a_2 = 2^2 - 2a_1 = 4 - 2(-2) = 8$ (1)

$a_3 = 3^2 - 2a_2 = 9 - 2(8) = -7$ (1)

$a_4 = 4^2 - 2a_3 = 16 - 2(-7) = 30$ (1)