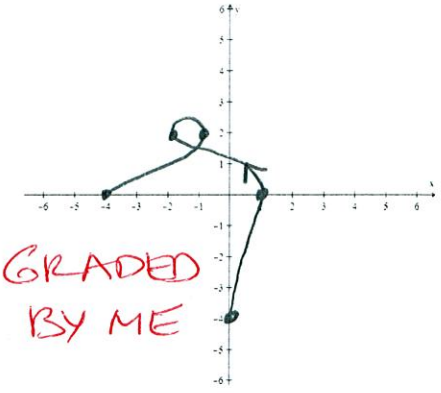
Sketch the curve represented by the parametric equations $\begin{aligned} x &= -t + \cos \pi t \\ y &= 3t - t^2 \end{aligned}$ for $-1 \le t \le 3$. **SCORE: _____ / 5 PTS**

Include the rectangular co-ordinates of 5 points on the curve. Indicate the orientation (direction) of the curve.

t	(x, y)
-1	$(0, -4)$
0	$(1, 0)$
1	$(-2, 2)$
2	$(-1, 2)$
3	$(-4, 0)$

$\left(\frac{1}{2}\right)$ POINT EACH = $\left(2\frac{1}{2}\right)$ TOTAL



GRADED BY ME

Eliminate the parameter and write the rectangular equation for the curve represented by the parametric equations $\begin{aligned} x &= \ln 2t \\ y &= 6t^3 \end{aligned}$. **Write your final answer in the form y as a simplified function of x.** **SCORE: _____ / 3 PTS**

(1) $t = \frac{1}{2}e^x$

(1) $y = 6\left(\frac{1}{2}e^x\right)^3$

(1) $y = \frac{3}{4}e^{3x}$

OR

$\left(\frac{1}{2}\right)$ $t = \sqrt[3]{\frac{y}{6}}$

$\left(\frac{1}{2}\right)$ $x = \ln 2\sqrt[3]{\frac{y}{6}}$

(1) $y = 6\left(\frac{1}{2}e^x\right)^3 = \frac{3}{4}e^{3x}$ (1)

Simplify the expression $\frac{(5n-2)!}{(5n+1)!}$. **SCORE: _____ / 3 PTS**

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

$\left(1\frac{1}{2}\right)$ $\left(1\frac{1}{2}\right)$

Find the value of $\sum_{p=2}^{5}\left(\frac{1}{2}(p!)+1\right)$. **SCORE: _____ / 3 PTS**

$2+4+13+61 = 80$

$\left(\frac{1}{2}\right)$ POINT EACH = (2) TOTAL

(1)

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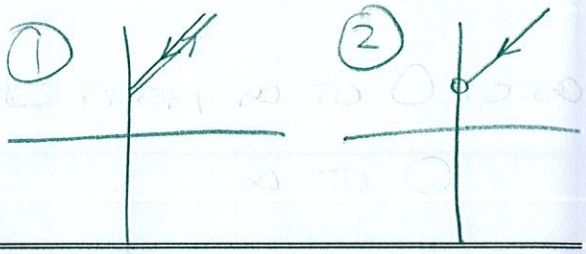
The parametric equations ① $x = t^2$, $y = t^2 + 2$ and ② $x = e^{-t}$, $y = e^{-t} + 2$ both correspond to the rectangular equation $y = x + 2$. **SCORE: ____ / 2 PTS**

Explain how the parametric curves differ from each other.

AS t GOES FROM $-\infty$ TO ∞,

① x ∞ TO 0 TO ∞

② ∞ TO ≈ 0



A cat jumps off a 6 foot shelf at an angle of 30° with the horizontal, at a speed of 4 feet per second. **SCORE: ____ / 3 PTS**

Find parametric equations that model the cat's trajectory (path).

$x = (4\cos 30^\circ)t = 2\sqrt{3}t$ (1)

$y = 6 + (4\sin 30^\circ)t - 16t^2 = 6 + 2t - 16t^2$ (1/2)

(1/2)

Write $\frac{27}{25} - \frac{23}{36} + \frac{19}{49} - \frac{15}{64} + \frac{11}{81} - \frac{7}{100} + \frac{3}{121}$ in sigma notation. ← ARITHMETIC $d = -4$ **SCORE: ____ / 4 PTS**

$\sum_{n=1}^{7} (-1)^{n+1} \frac{27-4(n-1)}{(n+4)^2} = \sum_{n=1}^{7} (-1)^{n+1} \frac{31-4n}{(n+4)^2}$ (1) (1) (1) (1)

OR $\sum_{n=0}^{6} (-1)^n \frac{27-4n}{(n+5)^2}$

OR $\sum_{n=5}^{11} (-1)^{n+1} \frac{47-4n}{n^2}$

* SUBTRACT (1) POINT IF YOU USED DIFFERENT (MISMATCHED) LETTERS/INDEX INSIDE Σ!

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

$9^2 = 7^2 + b^2 \rightarrow b = \sqrt{32} = 4\sqrt{2}$ (1/2)

(1/2) $x = 7\sec t$

(1/2) $y = 4\sqrt{2}\tan t$ (1/2)

(1 1/2) IF YOU HAVE BOTH

Write the first five terms of the sequence defined recursively by $a_{n+1} = n^2 - 2a_n$, $a_1 = 3$. **SCORE: ____ / 4 PTS**

Write your final answer as a sequence.

$a_2 = 1^2 - 2a_1 = 1 - 2(3) = -5$

$a_3 = 2^2 - 2a_2 = 4 - 2(-5) = 14$

$a_4 = 3^2 - 2a_3 = 9 - 2(14) = -19$

$a_5 = 4^2 - 2a_4 = 16 - 2(-19) = 54$

(1/2) IF WRITTEN IN A LIST

(1/2) 3, −5, 14, −19, 54

① IF YOU GOT 2 CORRECT

② 3

③ ALL 4