

Find parametric equations for the hyperbola with vertices $(\pm 3, 0)$ and foci $(\pm 7, 0)$.

SCORE: ____ / 4 PTS

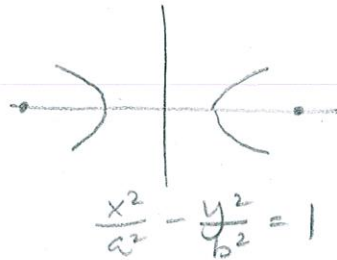
$$c^2 = a^2 + b^2$$

$$49 = 9 + b^2$$

$$b^2 = 40$$

$$b = \underbrace{2\sqrt{10}}_{\textcircled{\frac{1}{2}}}$$

$$\begin{array}{l} \textcircled{\frac{1}{2}} \boxed{\begin{array}{l} x = \underbrace{3}_{\textcircled{\frac{1}{2}}} \underbrace{\sec t}_{\textcircled{1}} \\ y = \underbrace{2\sqrt{10}}_{\textcircled{\frac{1}{2}}} \underbrace{\tan t}_{\textcircled{1}} \end{array}} \end{array}$$



Eliminate the parameter and write the rectangular equation for the curve represented by the parametric

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equations $x = \ln 4t$
 $y = 3t^2$. Write your final answer as y in terms of x .

$$e^x = 4t \rightarrow \underline{t = \frac{1}{4}e^x} \quad \textcircled{\frac{1}{2}}$$

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

$$\underline{y = \frac{3}{16}e^{2x}} \quad \textcircled{\frac{1}{2}}$$

Describe how the curves represented by the parametric equations $x = \sin t$ and $x = e^t$ differ.
 $y = 4 - \sin t$ and $y = 4 - e^t$

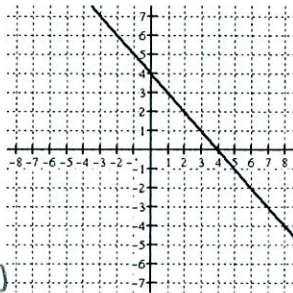
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NOTE: Both sets of equations correspond to the rectangular equation $y = 4 - x$ shown.

① $-1 \leq \sin t \leq 1$, SO GRAPH OSCILLATES BETWEEN
 $x = -1$ $(-1, 5)$ AND $x = 1$ $(1, 3)$

② AS t GOES FROM $-\infty$ TO ∞ ,
 $x = e^t$ GOES FROM ≈ 0 TO ∞ ,
SO GRAPH STARTS NEAR y -AXIS + GOES RIGHT/DOWN.

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Find the sum $\sum_{n=3}^6 (-1)^n (20 - n^2)$. You must show the terms being added.

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$$\underbrace{-11 + 4 + 5}_{(2)} - 16 = \underbrace{-18}_{(1)}$$

Write the series $\frac{1}{4} - \frac{2}{8} + \frac{6}{16} - \frac{24}{32} + \frac{120}{64} - \frac{720}{128}$ in sigma notation.

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

$$\text{OR } \sum_{n=0}^5 (-1)^n \frac{(n+1)!}{2^{n+2}}$$

$$\text{OR } \sum_{n=2}^7 (-1)^n \frac{(n-1)!}{2^n}$$

★ SUBTRACT $\frac{1}{2}$ POINT IF THE INDEX UNDER $\sum$ IS NOT THE VARIABLE IN THE FORMULA

Simplify the factorial expression $\frac{(3n)!}{(3n-2)!}$.

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$$\boxed{\frac{3n(3n-1)(3n-2)!}{(3n-2)!}} = \boxed{3n(3n-1)} \quad \textcircled{2}$$

① OK IF $\frac{3n(3n-1)(3n-2) \cdots (2)(1)}{(3n-2) \cdots (2)(1)}$ INSTEAD

Consider the sequence with $a_5 = 17$ and $a_{10} = 3$, and where each term is the previous term plus a fixed constant. SCORE: ____ / 7 PTS

- [a] Find the general formula for this sequence.

$$a_5 = a_1 + 4d = 17 \quad a_1 + 4\left(-\frac{14}{5}\right) = 17$$

$$a_{10} = a_1 + 9d = 3 \quad a_1 - \frac{56}{5} = 17$$

$$\textcircled{2} \quad 5d = -14$$

$$\textcircled{2} \quad d = -\frac{14}{5} = -2.8$$

$$\textcircled{1} \quad a_1 = \frac{141}{5} = 28.2$$

$$a_n = \frac{141}{5} - \frac{14}{5}(n-1) \quad \textcircled{2}$$

OR

$$a_n = 31 - \frac{14}{5}n \leftarrow \text{OK}$$

- [b] Use the general formula to find the 21st term of the sequence.

$$a_{21} = 31 - \frac{14}{5}(21)$$

$$= -\frac{139}{5} = -27.8$$

$$\textcircled{1} \quad \underline{\hspace{1cm}}$$

- [c] Find the sum of the first 21 terms of the sequence. You must show the use of a series formula.

$$S_{21} = \frac{21}{2} (28.2 - 27.8) = 4.2 \text{ or } \frac{21}{5}$$

$\textcircled{1} \quad \textcircled{1}$

Find the general formula for the sequence 64, 96, 144, 216, 324, ...

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$$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \times \frac{3}{2} & \times \frac{3}{2} & \times \frac{3}{2} & \times \frac{3}{2} \end{array}$$

$$a_n = \underbrace{64}_{\textcircled{1}} \underbrace{\left(\frac{3}{2}\right)^{n-1}}_{\textcircled{1}} \textcircled{1}$$