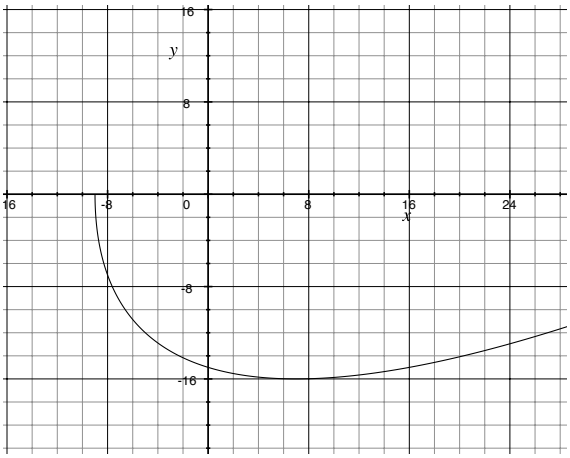
East Los Angeles College
Department of Mathematics
Math 262
Test 4-Take Home

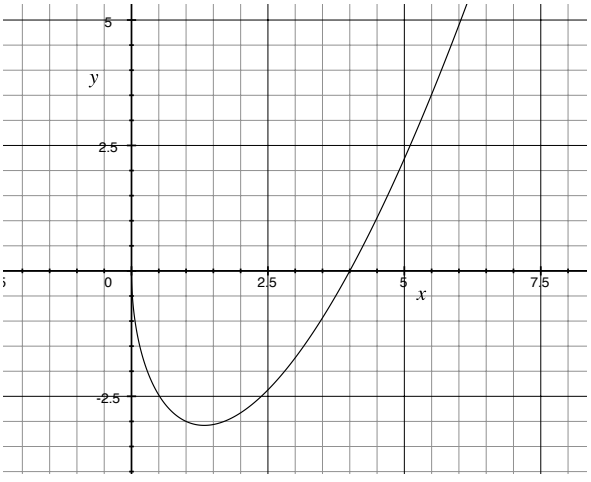
Show your work for credit.

Let $\begin{matrix} x = t^2 - 9 \\ y = t^2 - 8t \end{matrix}$ be parametric equations.

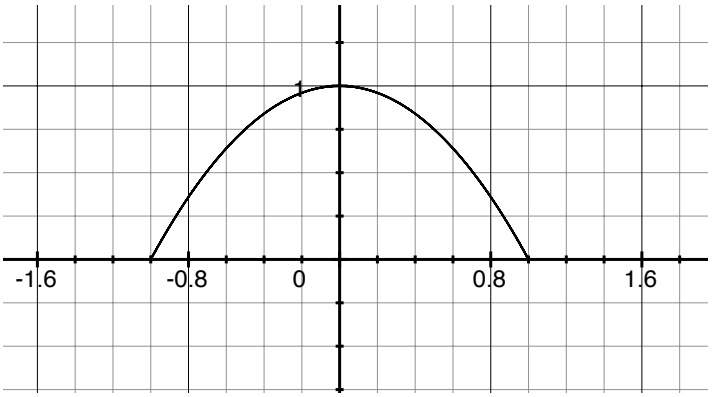


1. Draw an arrow indicating the direction of motion.
2. Find $\frac{dy}{dx}$ when $t = 4$
3. Find the equation of the tangent line when $t = 4$.
4. Find the points where the slope of the tangent line equals $\frac{1}{2}$
5. Find the points where the tangent line is horizontal.

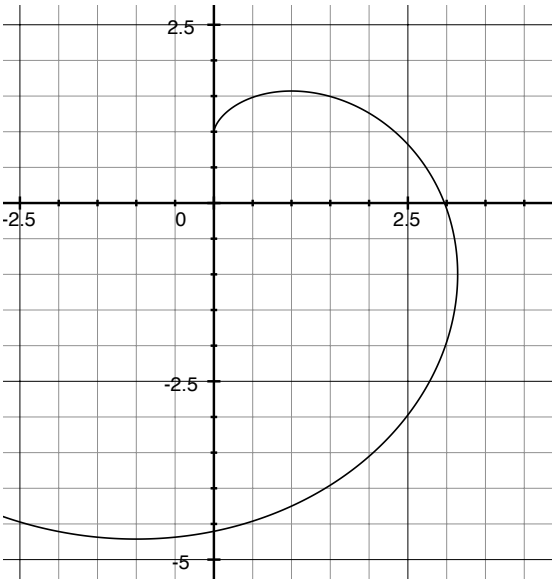
6. Let $\begin{matrix} x = t^2 \\ y = t^3 - 4t \end{matrix}$ be parametric equations. Determine the interval for t in which the curve is concave up.



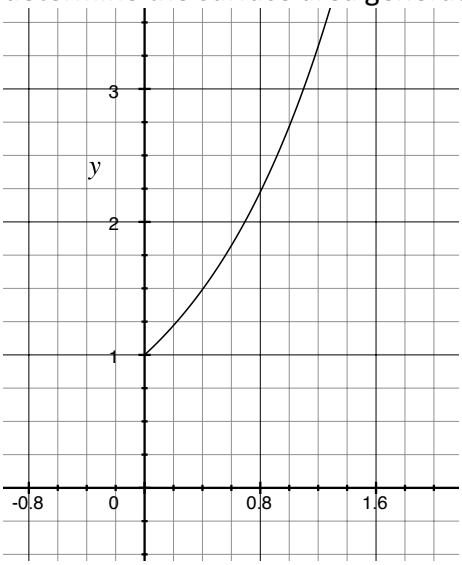
7. Let $\begin{matrix} x = \sin(t) \\ y = cos^2(t) \end{matrix}$ for $0 \leq t \leq \frac{\pi}{2}$. Compute the area under the parametric curve



8. Let $\begin{matrix} x = sin(t) - tcos(t) \\ y = \cos(t) + tsin(t) \end{matrix}$ for $0 \leq t \leq 2$ be parametric equations. Determine the arc length for the curve.



9. Let $\begin{matrix} x = t \\ y = e^t \end{matrix}$ for $0 \leq t \leq 1$ be parametric equations. If you rotate the curve about the x-axis, determine the surface area generated.



Determine the limits of the following sequences.

10. $\left\{\frac{3n^3}{n^3+1}\right\}$

11. $\{e^{-n}n^{10}\}$

12. $\left\{\left(\frac{5+n}{n}\right)^n\right\}$

13. $\left\{\frac{n^4}{n^4+1}\right\}$

14. $\left\{\frac{(-1)^n n^4}{n^4+1}\right\}$

15. $\left\{\frac{cos(n)}{n^2+1}\right\}$

Determine whether the series converges or diverges.

16. $\sum_{k=0}^{\infty}\left(\frac{e}{\pi}\right)^k$

17. $\sum_{k=0}^{\infty}\left(-\frac{3}{4}\right)^k$

18. $\sum_{k=1}^{\infty}\frac{2^{k-1}}{3^{k+1}}$

Determine whether the following telescoping series converge or diverge. Show your work by computing the sequence of partial sums.

19. $\sum_{k=1}^{\infty}\left(\frac{1}{k+1}-\frac{1}{k+2}\right)$

20. $\sum_{k=1}^{\infty}\left(\sqrt{k+1}-\sqrt{k}\right)$