

Show **ALL** work for credit; Give **EXACT** answers when possible; **Simplify** answers;

1. Find and **SIMPLIFY** the derivative of $\frac{t^2 + 7t}{t^2 - 1}$

2. Find the derivative of $(3^x + \pi^3)^{100}(\sec 5x + e^x)^{-10}$ (You don't have to simplify this one)

3. Find the derivative of $\arctan(\sin(2\theta + \ln(\theta + 1)))$

4. Find the $\lim_{x \rightarrow 0} \frac{\tan 3x}{x}$

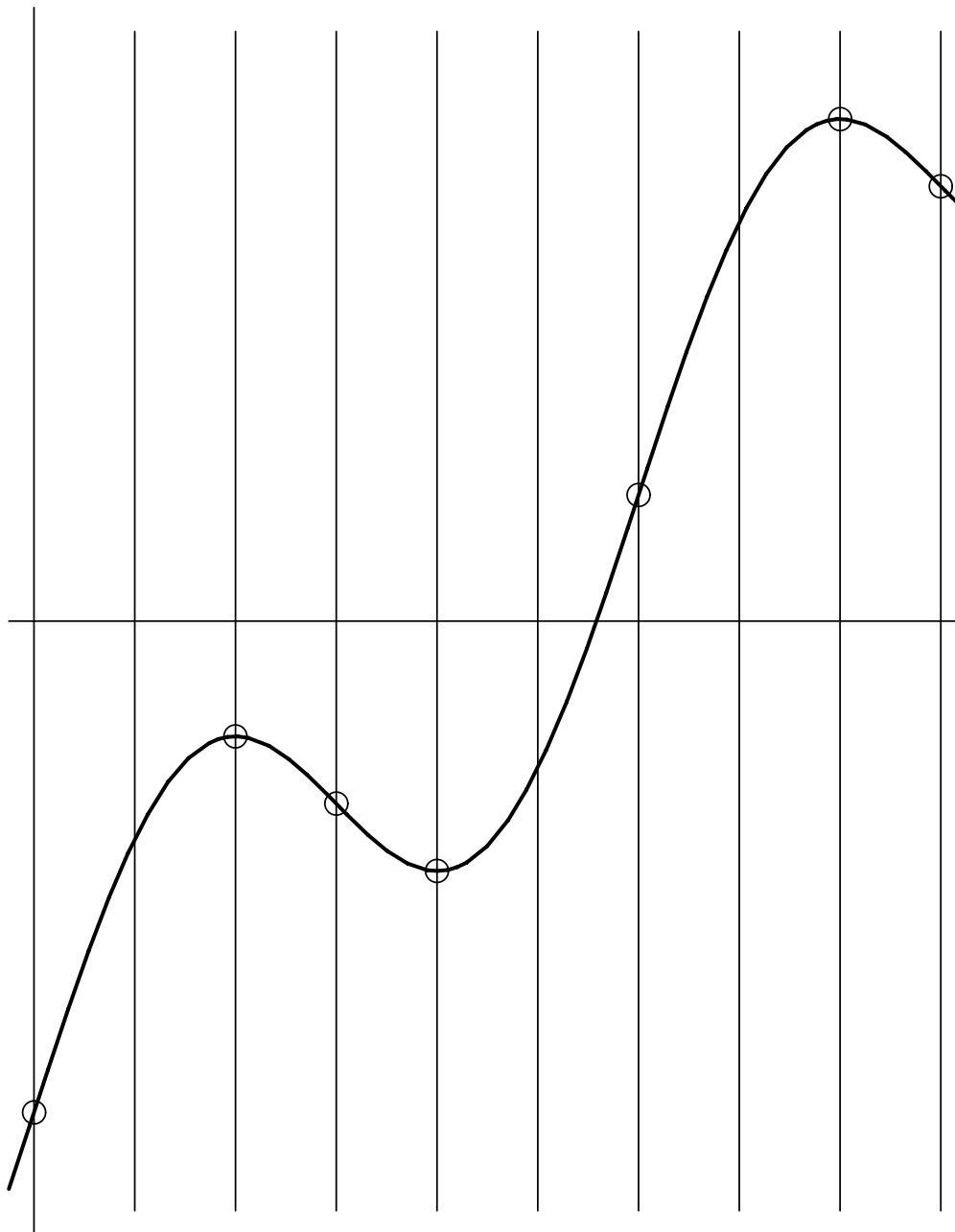
5. Implicitly find the derivative $\frac{dy}{dx} = y'$ if $xy + x^2y^2 + e^{2y} = 1$

6. Use the table below to estimate $h'(5)$ if $h(x) = f(g(x))$

x	0	1	2	3	4	5	6
$f(x)$	12.4	14.8	18.4	23.0	25.9	27.5	29.1
$g(x)$	5.8	4.0	3.7	2.6	1.7	1.0	0.7

7. Implicitly find the **VALUE** of second derivative $\frac{d^2y}{dx^2} = y''$ **AT THE POINT** $(3, 4)$, if $x^2 + y^2 = 25$.

8. For the function $f(x)$ below sketch both the first $f'(x)$ and second $f''(x)$ derivative on the same graph. Be especially careful about the placement of the zero's of $f'(x)$ and $f''(x)$. Be sure to label the graphs.



9. Use the tangent line to approximate $(16.0005)^{3/2}$

10. A 5 foot child is running 3 ft/sec toward her shadow on a wall. The light source is 24 feet from the wall on the ground. What rate is her shadow changing when the child is 9 feet from the wall.

