

4. If $x^4 + y^4 = 16$, show that $y'' = -48 \frac{x^2}{y^7}$.
5. Suppose f is a one-to-one differentiable function and its inverse f^{-1} also differentiable. Use implicit differentiation to show that

$$\frac{d}{dx} [f^{-1}(x)] = \frac{1}{f'[f^{-1}(x)]}, \quad \text{where } f' \neq 0.$$

6. Use the definition of derivative to show that $\frac{d}{dx} [\log_b x] = \frac{1}{x \ln b}$, $x > 0$.
7. show that the equation $4x^3 - 6x^2 + 3x - 2 = 0$ has a real root between 1 and 2.
8. Show that the function $f(x) = |x - 3|$ is continuous everywhere.
9. Given

$$f(x) = \begin{cases} x^2 & \text{if } x \geq 0 \\ e^x & \text{if } x < 0. \end{cases}$$

Discuss the continuity of f at $x = 0$.

10. Find the horizontal and vertical asymptotes of the graph of $f(x) = \frac{\sqrt{2x^2 + 1}}{3x - 5}$.
11. Find the critical points of $f(x) = 4x^{3/5} - x^{8/5}$.
12. Find the absolute max and absolute min of $f(x) = x^4 - 2x^2 + 3$ on $[-2, 3]$.
13. Sketch the graph of $\frac{2x - 5}{x + 3}$.
14. State Rolle's theorem and verify that the function $f(x) = \sin 2\pi x$ satisfies the hypotheses of Rolle's theorem on the interval $[-1, 1]$. Then find a number c that satisfies its conclusion on this interval.
15. Is it true that the equation $y = y''' + 5y' - 6$ is satisfied by $y = x$?
16. Is it true that the inverse function of $y = \sin x$ is $y = \frac{1}{\sin x}$?
17. Is it true that the function $y = \ln x$ is differentiable everywhere?
18. Is it true that if $k(x) = f(g(x))$, then $\frac{d^2 k}{dx^2} = f'(g) \cdot g'' + f''(g) \cdot (g')^2$?
19. What is the error in the following steps:

$$\lim_{x \rightarrow 0} \frac{\sin x}{x^2} = \lim_{x \rightarrow 0} \frac{\cos x}{2x} = \lim_{x \rightarrow 0} \frac{-\sin x}{2} = 0$$

and determine the correct value of this limit.

20. Use local linear approximation to approximate $\sin 29^\circ$.