

1. Find the derivative of $f(x) = \sqrt{x+1}$ using the definition of the derivative.

2. Find the values of x (if any) at which f is not continuous.

a) $f(x) = x^3 - 2x + 3$

b) $f(x) = \frac{x-4}{x^2-16}$

c) $f(x) = \frac{1}{\sqrt{x+2}}$

3. Find the equation of the tangent line to $y = \sqrt{2x+1}$ at $x = 4$.

4. Find $f'(x)$ if $f(x) = \left(\frac{1}{x} + \frac{1}{x^2}\right)(3x^3 + 27)$.

5. Find dy/dx if $y = \sqrt{3x - \sin^2(4x)}$.

6. Find dy/dx if $y = \frac{1 + \csc(x^2)}{1 - \cot(x^2)}$

7. Let $f(x) = \begin{cases} x \sin \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$. Show that f is continuous at $x = 0$.