

For each function $f(x)$ find $f'(x)$.

1. $f(x) = \sqrt{(3x^4 - 1)^3}$

11. $f(x) = (3x + 1)^2(2x + 3)^8(5x - 2)^4$

2. $f(x) = \sqrt{(3x^4 - 1)^3 + x}$

12. $f(x) = \frac{(x - 1)(x - 2)}{(x - 3)(x - 4)}$

3. $f(x) = \frac{\sqrt{1 - x}}{x^2 - 4}$

13. $f(x) = (x^2 - 17x)^{-9} \cdot \frac{x^2 + 1}{\sqrt{2x + 1}}$

4. $f(x) = \sqrt{x}(5x + 2)^{100}$

14. $f(x) = (((x^2 + 1)^2 + 1)^2 + 1)^2$

5. $f(x) = \sqrt{x(5x + 2)^{100}}$

15. $3x^2 + 4y^2 + xy = 0$ (find $\frac{dy}{dx}$)

6. $f(x) = (\sqrt{x}(5x + 2))^{100}$

16. $\frac{y^3 + 1}{x^3 + 1} = y^2$ (find $\frac{dy}{dx}$)

7. $f(x) = \frac{x^5 + x\sqrt{x}}{x^2}$

17. $\frac{1}{y} - \frac{1}{x} = \frac{x^3}{y - 1}$ (find $\frac{dy}{dx}$)

8. $f(x) = \frac{1}{\sqrt{x}} + \frac{1}{x^2}$

18. $A(t) = \pi(r(t))^2$ (find $\frac{dA}{dr}$ and $\frac{dA}{dt}$)

9. $f(x) = \sqrt{\sqrt{x}}$

19. $f(x) = \frac{1}{x^2 + 1}$
(find $f'(x)$, $f''(x)$, and $f'''(x)$)

10. $f(x) = \frac{3}{x^{-\frac{3}{2}}\sqrt{x}}$

20. $f(x) = 10x^8 + 6x^5 - 4x^2 + 17$
(find $f'(x)$ and $f^{[8]}(x)$ and $f^{[9]}(x)$)