

Find the derivative of each function. **Simplify the answers.**

1. $f(x) = \frac{x^4}{4} + \frac{2}{3}x^3 - 6x^2 + 8$

2. $y = \frac{3}{x^5} - \frac{7}{x^3} + 6\sqrt{x}$

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

4. $h(x) = \frac{3x^4 - 5}{x^3 + 4}$

5. $f(x) = 3x + x \tan x$

6. $g(x) = \frac{\cos x}{1 + \sin x}$

7. Find $\frac{d^2P}{dt^2}$, if $P = t^5 - 2t^3 + 4t^2 - t$

8. Find $y'''(-2)$ given $y = 2x^5 - t^3 + 4t^2 - 7t$

9. Write the equation for the lines that are tangent and normal to the graph of $y = x^2 \sin x$ at $x = \frac{\pi}{2}$.

10. Suppose f and g are differentiable with values as shown.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
2	3	4	5	6

Find the derivative at $x = 2$ for the following functions. Show all work.

a. $h(x) = f(x) + g(x)$

b. $j(x) = f(x) \cdot g(x)$

c. $m(x) = \frac{f(x)}{g(x)}$

d. $n(x) = x \cdot f(x)$

e. $p(x) = \frac{x^2}{g(x)}$

11. $f(x) = \sqrt{x}g(x)$ $g(4) = 2$ $g'(4) = 3$
 $f'(4) =$