

**Section 3.4: Additional Problems**

Problems 1-5 refer to the functions  $f$  and  $g$  that satisfy the properties as shown in the table. Find the indicated quantity.

$x$	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
0	1	-3	3	5
1	2	6	7	11
2	-5	0	2	10
3	4	-1	-4	8

- $H'(0)$  if  $H(x) = f(g(x))$
- $J'(-1)$  if  $J(x) = f(x^2)$
- $K'(2)$  if  $K(x) = (x^2 + g(x))^3$
- $J'(1)$  if  $J(x) = (x^3 + 1)g(3x)$
- $H'(1)$  if  $H(x) = g(x^2 + f(x))$

For problems 6-8, find the values of  $x$  where the tangent line is horizontal.

- $y = x^2(x - 3)^4$
- $y = (x + 1)^2(x - 3)^3$
- $y = (5 - x^2)^7(7x + 1)^4$

In problems 9-18, find each derivative. You do not have to simplify.

- $f(x) = (2x + 1)\sqrt{x^2 + 1}$
- $f(x) = e^{3x+e^x}$
- $f(x) = (x^2 + 6x + 1)^4$
- $f(x) = 3^{x^2+5x+1}$
- $y = \frac{e^{x^2+4x}}{e^{4x+5}}$
- $f(x) = (x^3 + 5x + 9)^{\frac{3}{2}}$
- $f(x) = \sqrt[3]{x^3 + \frac{1}{x^3}}$

- $f(x) = (3x^5 - 1)^4(x^3 + 2)^3$
- $f(x) = [(x^4 - 7x^2)^6 + 4x^3]^5$
- $f(x) = (2x^3 + 7x)e^{(x^4+3x^2+1)}$

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19. Find the derivative and simplify the answer.

$$y = \frac{x^2 + 1}{\sqrt{x^2 + 2}}$$

20. Find  $D^{1047} \sin(3x + 1)$  or  $\frac{d^{1047}}{dx^{1047}} \sin(3x + 1)$