

AP Calculus

Derivatives in Function Notation

$x$	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-2	3	1	-5	8
-1	-9	7	4	1
0	5	9	9	-3
1	3	-3	2	6
2	-5	3	8	?

This isn't a lot of information. For example, we can't compare to figure some things out, using the rules of differentiation

1. Let  $w(x) = f(g(x))$ . What is  $w'(1)$ ?

$$w'(x) = f'(g(x)) \cdot g'(x)$$

$$w'(1) = f'(g(1)) \cdot g'(1)$$

$$f'(2)(6)$$

$$\frac{3(6)}{18}$$

3. Let  $b(x) = f(x)(2x-3)^2$ . What is  $b'(2)$ ?

$$b'(x) = f(x) \cdot 2(2x-3)' + (2x-3)^2 f'(x)$$

$$b'(2) = f(2)(2)(2-3)' + (2(2)-3)^2 f'(2)$$

$$(-5)(2)(1)(2) + [1]^2(3)$$

$$-20 + 3 = -17$$

5. Let  $h(x) = (\sqrt[3]{x})^4 f(x)$ . What is  $h'(1)$ ?

$$x^{4/3} f'(x) + f(x) \frac{4}{3} x^{1/3}$$

$$(1)^{4/3} f'(1) + f(1) \left(\frac{4}{3}\right) (1)^{1/3}$$

$$(1)(-3) + (3) \left(\frac{4}{3}\right) (1)$$

$$-3 + 4 = 1$$

7. Let  $l(x) = x^3 g(x)$ . If  $l'(2) = -48$ , what is  $g'(2)$ ?

$$l'(x) = x^3 g'(x) + g(x) 3x^2$$

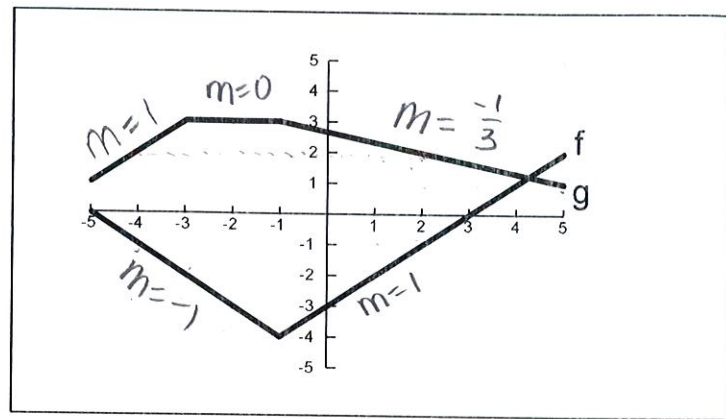
$$l'(2) = (2)^3 g'(2) + g(2) 3(2)^2$$

$$-48 = 8(g'(2)) + 8(3)(4)$$

$$-48 = 8(g'(2)) + 96$$

$$-96 = 8(g'(2))$$

$$\frac{-96}{8} = \frac{8(g'(2))}{8} \quad g'(2) = -12$$



9. Let  $w(x) = g(f(x))$ . What is  $w'(1)$ ?

$$w'(x) = g'(f(x)) \cdot f'(x)$$

$$w'(1) = g'(f(1)) \cdot f'(1)$$

$$w'(1) = g'(-2) \cdot f'(1)$$

$$(0)(1)$$

$$0$$

11. Let  $b(x) = f(x)e^{2x}$ . What is  $b'(-4)$ ?

$$b'(x) = f(x)e^{2x}(2) + e^{2x} f'(x)$$

$$= e^{2x} [2f(x) + f'(x)]$$

$$= e^{-8} [2f(-4) + f'(-4)]$$

$$= e^{-8} [2(-1) + (-1)] = e^{-8} (-3)$$

13. Let  $h(x) = \sqrt{f(x)}$ . What is  $h'(2)$ ?

$$h(x) = (f(x))^{1/2}$$

$$h'(x) = \frac{1}{2} (f(x))^{-1/2} f'(x)$$

$$= \frac{f'(2)}{2\sqrt{f(2)}} = \frac{1}{2\sqrt{-1}} = \text{imaginary}$$

$$i$$

15. Let  $k(x) = \frac{\sec x}{f(x)}$ . What is  $k'(0)$ ?

$$\frac{f(x)\sec x \tan x - \sec x f'(x)}{[f(x)]^2}$$

$$\frac{f(0)\sec(0)(\tan(0)) - \sec(0)f'(0)}{f(0)^2}$$

$$\frac{(-3)(\frac{1}{1})(0) - (\frac{1}{1})(1)}{(-3)^2} = \frac{-1}{9}$$