

Use the definition of a derivative to find the first derivative.

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

2.  $y = \frac{2}{x}$

Find the first 4 derivatives.

3.  $g(x) = 2 \sin x - x^2$

4.  $h(x) = \frac{2}{x}$

Find the average rate of change on the given closed interval.

5.  $q(x) = 3x^2 - x + 4; [0, 4]$

6.  $w(x) = 2 \sin x; \left[0, \frac{3\pi}{2}\right]$

Write the equation of the line (a) tangent and (b) normal to the function at the given  $x$  value.

7.  $f(x) = x^3 - 2x^2 + 3x; x = -2$

8.  $k(x) = 2 \sin x; x = \frac{\pi}{3}$

9.  $h(x) = \sqrt{x} + 2\sqrt{x^3}; x = 4$

10.  $g(x) = \frac{6}{x} + \frac{4}{x^2}; x = 2$

Differentiate each function.

11.  $f(x) = 3 - \frac{3}{5t}$

12.  $y = \sqrt[3]{x}(x^2 - 2x + 1)$

$$13. k(x) = \frac{x^2+1}{2x-3}$$

$$14. z(x) = x^3 \sin x + 3x \cos x$$

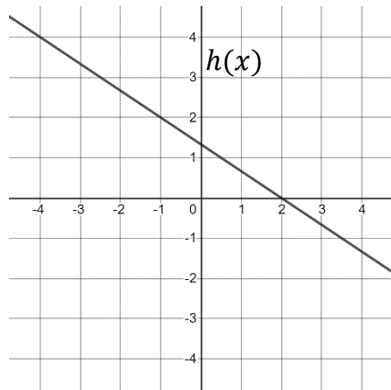
$$15. y = \frac{\cos x}{\sqrt{x}}$$

$$16. h(x) = \frac{1-4x-3x^2}{\sqrt{x}}$$

$$17. y = x^2 \tan x$$

$$18. g(x) = \frac{x^3-3x^2+4}{x^2}$$

Use the graph of  $h(x)$  and table of given values on  $f(x)$  and  $g(x)$  below to answer the following questions.



$x$	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	4	-3	2	7

19. Find  $k'(-1)$  when  $k(x) = 2h(x) - 3f(x)$ .

20. Find  $k'(-1)$  when  $k(x) = g(x)h(x)$ .

21. Find  $k'(-1)$  when  $k(x) = \frac{f(x)}{g(x)}$ .

22. Find  $k'(-1)$  when  $k(x) = \frac{h(x)}{x^2-x}$ .