

Find the derivative:

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

2.  $g(x) = (8x - 7)^{-5}$

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

4.  $F(v) = (17v - 5)^{1000}$

5.  $k(r) = \sqrt[3]{8r^3 + 27}$

6.  $H(x) = \frac{2x + 3}{\sqrt{4x^2 + 9}}$

7.  $f(\theta) = \frac{\sin \theta}{\theta}$

8.  $g(t) = t^3 \sin t$

9.  $h(z) = \frac{1 - \cos z}{1 + \cos z}$

10.  $f(x) = \frac{\tan x}{1 + x^2}$

11.  $k(x) = \sin(x^2 + 2)$

12.  $H(\theta) = \cos^5 3\theta$

13.  $g(z) = \sec(2z + 1)^2$

14.  $f(x) = \cos(3x)^2 + \cos^2 3x$

15.  $K(z) = z^2 \cot 5z$

16.  $h(\theta) = \tan^2 \theta \sec^3 \theta$

17.  $h(w) = \frac{\cos 4w}{1 - \sin 4w}$

18.  $f(x) = \tan^3 2x - \sec^3 2x$

19.  $f(x) = \sin \sqrt{x} + \sqrt{\sin x}$

20. If  $k(x) = f(g(x))$  and if  $f(2) = -4$ ,  $g(2) = 2$ ,  $f'(2) = 3$ ,  $g'(2) = 5$ ,  
find  $k(2)$  and  $k'(2)$

Calculus AB  
Evaluate the limits

Chapter 2 Worksheet

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1)  $\lim_{h \rightarrow 0} \frac{(3+h)^{23} - 3^{23}}{h}$

2)  $\lim_{x \rightarrow 2} \frac{4x^3 - 32}{x - 2}$

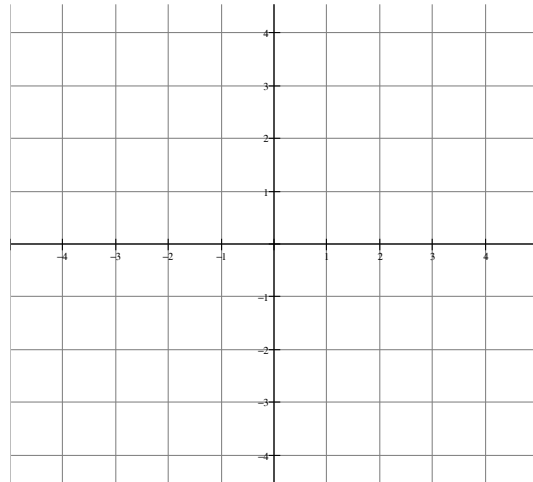
Sketch the graph of the function, given the following information.

$f(-4) = -3, f'(-1) = 0, f'(2) = 0$

3)  $f'(x) > 0, -4 < x < -1$

$f'(x) < 0, -1 < x < 2$

$f'(x) > 0, x > 2$



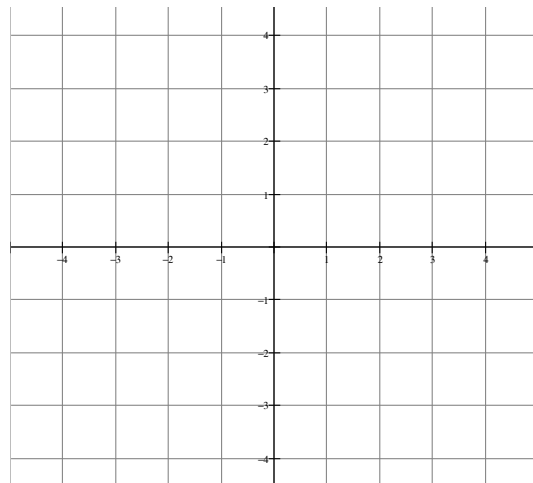
$f(0) = 0, f'(0) = 0, f'(-2) = 0,$

$f'(4) = 0$

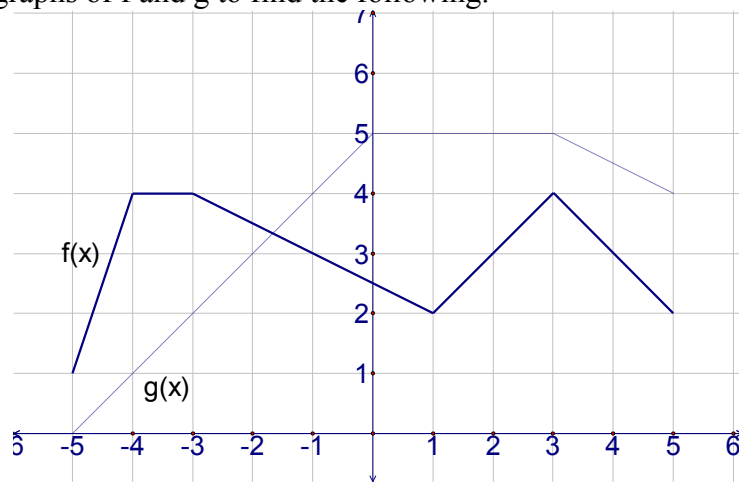
4)  $f'(x) > 0, x > 0$

$f'(x) < 0, x < -2$

$f'(x) > 0, -2 < x < 0$



5) Use the graphs of  $f$  and  $g$  to find the following.



a)  $h(x) = f(x) \cdot g(x)$

find  $h'(-1)$

b)  $h(x) = \frac{f(x)}{g(x)}$

find  $h'(2)$

c)  $h(x) = f(g(x))$

find  $h'(0)$

6) Given the position (distance) function  $s(t) = -4.9t^2 + 120t + 45$  of a free falling object. Find the velocity and acceleration of the object when it is 20 meters high. Assume the object was projected into the air at time  $t = 0$ .

Related work and tangent WS

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A ladder 5 feet long is leaning against the wall of a house. The base of the ladder is pulled away from the wall at a rate of 2 feet per sec. Draw a neat labeled diagram and then answer the following questions.

a) How fast is the top of the ladder moving down the wall when the base of the ladder is 4 feet from the wall?

b) Consider the area of the triangle formed by the wall of the house, the ladder, and the ground. Find the rate at which the area is changing when the base of the ladder is 4 feet from the wall?

c) Find the rate at which the angle between the ladder and the wall of the house is changing when the base of the ladder is 4 feet from the wall?

Find the equation of the tangent line to the curve  $f(x) = x^2$  that passes through the point  $(1, -3)$  and intersects the curve in the second quadrant.