

Calculus A Product, Quotient and Chain Rules Review      Name:

1. Differentiate the function  $y = \frac{x^2+4x+3}{\sqrt{x}}$ .

2. Find the equation of the tangent line to  $f(x) = x + \sqrt{x}$  at (1,2)

3. Suppose that  $f(2) = 3$ ,  $f'(2) = 2$ ,  $g(2) = -1$ , and  $g'(2) = -2$ . Find the following values.

a.  $\frac{d}{dx}[f(x)g(x)]$  at  $x = 2$

b.  $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right]$  at  $x = 2$

c.  $\frac{d}{dx}\left[\frac{g(x)}{f(x)}\right]$  at  $x = 2$

4. If  $f$  is a differentiable function, find an expression for the derivative of each of the following function.

a.  $y = x^2 f(x)$

b.  $y = \frac{f(x)}{x^2}$

5. Find the derivative of the following functions

a.  $y = (x^3 - 1)^{100}$

b.  $y = \cot^2(\sin \theta)$

c.  $f(x) = \frac{1}{\sqrt[3]{x^2+x+1}}$

d.  $g(t) = \left(\frac{t-2}{2t+1}\right)^9$

e.  $y = \sin(\cos(\tan x))$

6. State the derivative of  $h(x) = f(g(x))$ .

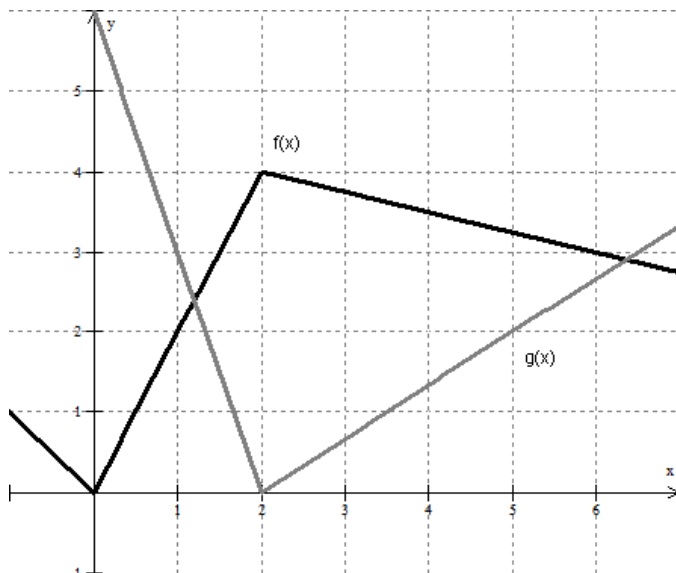
7. A table of values for  $f, g, f'$ , and  $g'$  is given below. Use the information in #6 above to evaluate the following derivatives.

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

a. If  $h(x) = f(g(x))$ , find  $h'(1)$

b. If  $H(x) = g(f(x))$ , find  $H'(1)$

8. If  $f$  and  $g$  are the functions whose graphs are shown below, let  $u(x) = f(g(x))$ ,  $v(x) = g(f(x))$ , and  $w(x) = g(g(x))$ . Find each derivative, if it exists. If it does not exist, explain why. Remember that the derivative of a function at a point is the slope of the tangent to the curve there.

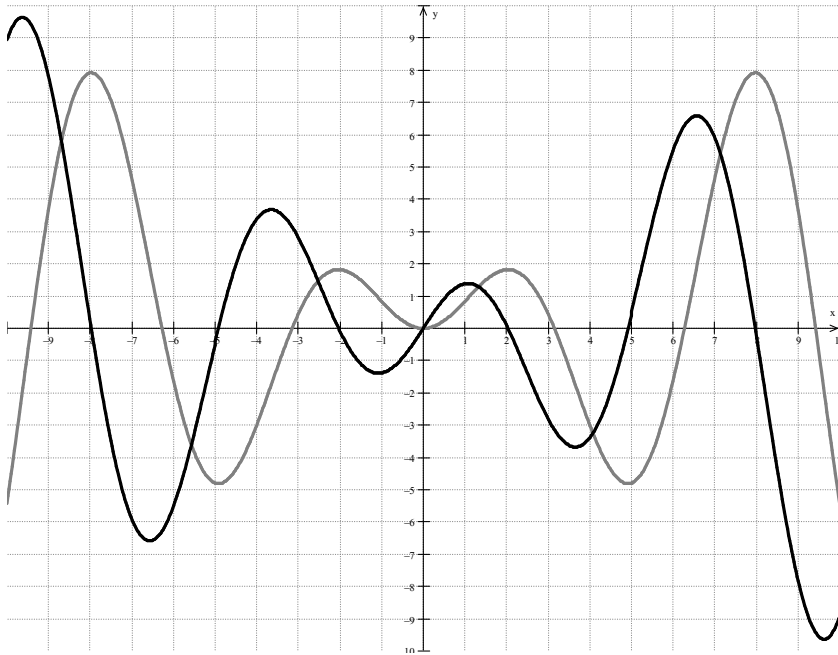


a.  $u'(1)$

b.  $v'(1)$

c.  $w'(1)$

9. In the graph below, label  $f(x)$  and  $f'(x)$  appropriately.



10. Give at least three specific points of evidence for your decision in 9 above.

a.

b.

c.