

Find the derivative for each of the following.

1. $y = \cos\left(\csc\left(\sin\left(e^{\sqrt{x}}\right)\right)\right)$

2. $f(x) = e^{\frac{x^2-3}{\sin(2x)}}$

3. $h(x) = \ln(\sec^2(5x))$

4. $r(t) = \csc^2(\sin(3x))$

5. Assume that $f(x)$ and $g(x)$ are differentiable functions about which we know information about a few discrete data points. The information we are summarized in the tables below.

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

Use your differentiation rules to determine each of the following.

a) If $p(x) = x \cdot f(x)$, find $p'(2)$

b) If $q(x) = 3 \cdot f(x)g(x)$, find $q'(-2)$

c) If $r(x) = \frac{f(x)}{5g(x)}$, find $r'(0)$

d) If $m(x) = \frac{3x^2g(x)}{f(x)}$, find $m'(-1)$