2.1 Product and Quotient Rules: Quiz D

Name: _____ Time: 25 minutes No calculator 40 points

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Answer exactly the question asked. Show work on every question. Angles are in radians.
If a derivative does not exist, write DNE. If a function value does not exist, write *undefined*.

1. Find $f'(x)$ for each function. **(2 each, 10 pts)**
   You need not list x-values where $f'(x)$ does not exist.

   (a) $f(x) = (x+2)\csc x$

   (b) $f(x) = \dfrac{2x+7}{5-x}$

   (c) $f(x) = \dfrac{x^2-9}{(x-3)(2x+6)}$

   (d) $f(x) = 2\csc x - \dfrac{\sin x}{\cos x \tan x}$

   (e) $f(x) = 3\pi \csc\left(\frac{\pi}{6}\right)$

2. Let $f(x) = \dfrac{\sin x}{1+\cos x}$. Find an equation of the tangent line to the graph of f at $x = \frac{\pi}{2}$. **(5 pts)**

3. Let $f(x) = (1+\sin x)\cos x$. **(5 pts)**
   Find every x in the interval $\left(\frac{\pi}{2}, 2\pi\right)$ at which the graph of f has a horizontal tangent line.

4. Figure D4 shows the graphs of f (solid) and g (dashed). **(4 each, 8 pts)**

Each graph is made of straight line segments that meet at grid points. Let $q(x) = \dfrac{f(x)}{g(x)}$ and $p(x) = f(x)\,g(x)$.

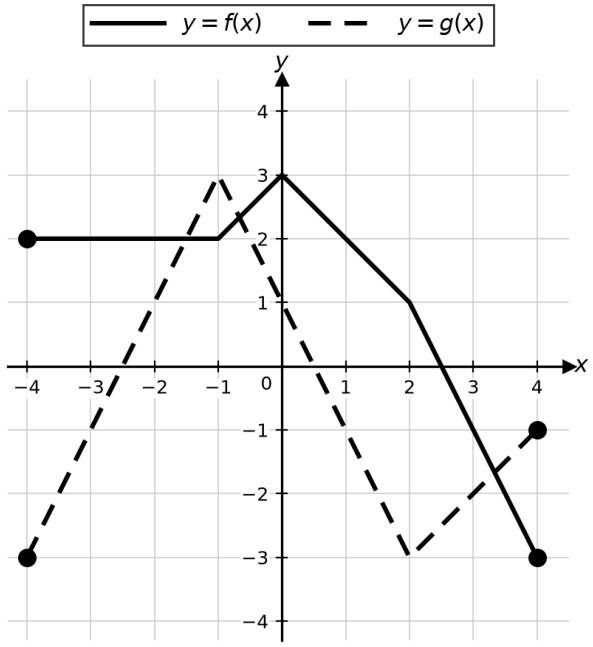


Figure D4

(a) Find $q'(1)$.

(b) Find $p'(3)$.

5. Each part describes a different function. **(4 each, 8 pts)**

(a) Let $k(x) = \dfrac{x^2}{g(x)}$. It is known that $g(2) = 4$ and $k'(2) = -\frac{1}{2}$. Find $g'(2)$.

(b) Let $p(x) = f(x)\,g(x)$. It is known that $f(3) = -2$, $f'(3) = 4$, $g'(3) = 1$, and $p'(3) = 10$. Find $g(3)$.

6. The table gives selected values of f, g, and their derivatives. **(3 + 1, 4 pts)**

Let $h(x) = \dfrac{f(x)}{g(x)}$ and $k(x) = x\,g(0)$.

x	$g(x)$	$f'(x)$	$g'(x)$	$f(x)$
0	2	−1	5	3
2	4	3	1	−2
4	−3	2	−2	1

(a) Find $h'(2)$.

(b) Find $k'(4)$.