2.1 Product and Quotient Rules: Quiz B

Name: _____ Time: 25 minutes No calculator 40 points

To the extent possible under law, the author(s) have waived all copyright and related or neighboring rights to this practice quiz. CC0 1.0 Universal: https://creativecommons.org/publicdomain/zero/1.0/. Prepared with assistance from Claude, an AI model made by Anthropic. **Provided AS IS, without warranty of any kind; use at your own risk.** Not every item has been vetted; problems, answers, and keys may contain errors.

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) $f(x) = (x^2 + 1)\sin x$

   (b) $f(x) = \dfrac{x^2}{2x - 1}$

   (c) $f(x) = \dfrac{10x - 15}{4x - 6}$

   (d) $f(x) = 3\sec x + \tan x \cot x$

   (e) $f(x) = \sin\left(\frac{\pi}{3}\right)\tan\left(\frac{\pi}{3}\right)$

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

3. Let $f(x) = \tan x - 4x$. **(5 pts)**
   Find every x in the interval $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ at which the graph of f has a horizontal tangent line.

4. Figure B4 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 $q(x) = \dfrac{g(x)}{f(x)}$ and $p(x) = f(x)\,g(x)$.

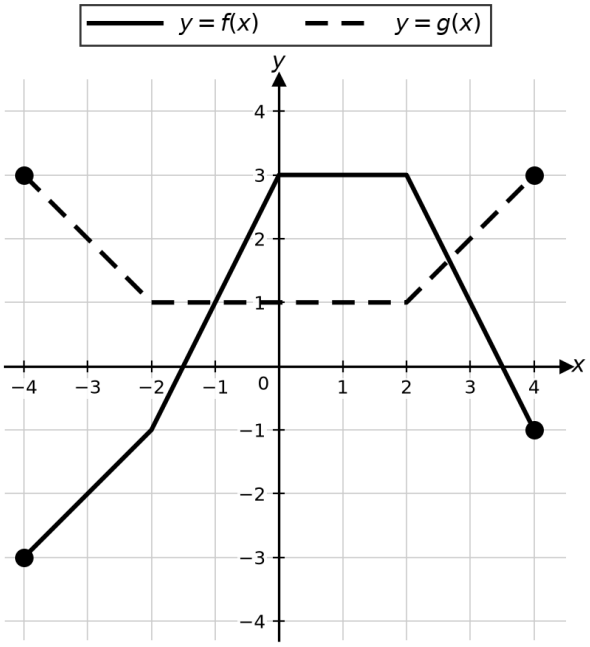


Figure B4

(a) Find $q'(3)$.

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

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

(a) Let $h(x) = f(x)\,g(x)$. It is known that $f(2) = 3$, $f'(2) = -1$, $g(2) = 4$, and $h'(2) = 5$. Find $g'(2)$.

(b) Let $k(x) = \dfrac{x}{f(x)}$. It is known that $f(1) = 2$ and $k'(1) = -\frac{3}{4}$. Find $f'(1)$.

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 $k(x) = f(1)\,g(3)$ for every x.

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

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

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