2.1 Product and Quotient Rules: Quiz A

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) $f(x) = x^3 \cos x$

   (b) $f(x) = \dfrac{3x-2}{x+4}$

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

   (d) $f(x) = 4\tan x - \sec x \cos x$

   (e) $f(x) = \dfrac{\sec(\pi)}{\sin\left(\frac{\pi}{6}\right)}$

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

3. Let $f(x) = 2x + \cot x$. **(5 pts)**
   Find every x in the interval $(\pi, 2\pi)$ at which the graph of f has a horizontal tangent line.

4. Figure A4 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 $p(x) = f(x)\,g(x)$ and $q(x) = \dfrac{f(x)}{g(x)}$.

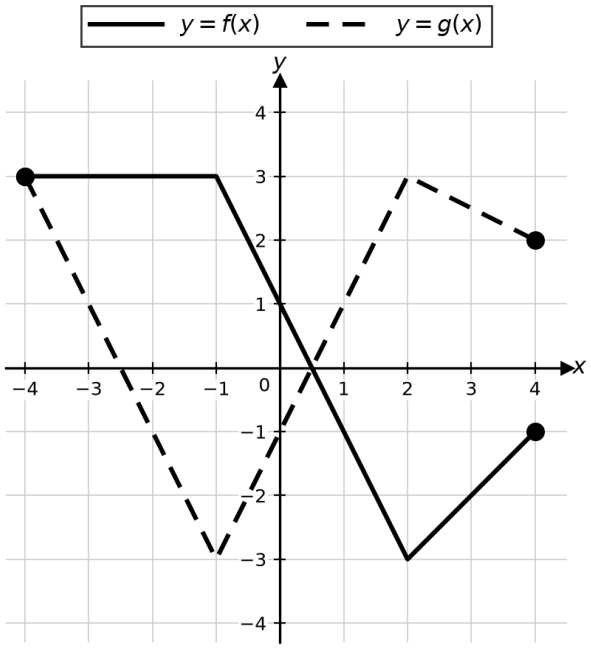


Figure A4

(a) Find $p'(0)$.

(b) Find $q'(-2)$.

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

(a) Let $h(x) = x^2 f(x)$. It is known that $f(3) = -2$ and $h'(3) = 6$. Find $f'(3)$.

(b) Let $k(x) = \dfrac{g(x)}{x}$. It is known that $g(2) = 6$ and $k'(2) = 1$. Find $g'(2)$.

6. The table gives selected values of f, g, and their derivatives. **(3 + 1, 4 pts)**
Let $h(x) = \dfrac{g(x)}{f(x)}$ and $k(x) = \dfrac{f(2)}{g(1)}$ for every x.

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

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

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