2.3-2.5 Derivative Rules: Form A Assessment

Name: _____ Time: 60 minutes No calculator 100 points

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Answer exactly the question asked. Show work on every question. Angles are in radians. Answers need not be simplified.

1. Find each derivative. **(12 pts)**

   (a) $y = (3 - x^2)\csc(x)$. Find y'.

   (b) $y = \dfrac{2x+1}{x^2-4}$. Find $\dfrac{dy}{dx}$.

   (c) $y = \sin\left(\dfrac{\pi}{6}\right)\cot\left(\dfrac{\pi}{4}\right)$. Find y'.

   (d) $y = \dfrac{6}{x^2} + x\sqrt{x}$. Find y''.

2. (a) Find $\dfrac{d^{35}}{dx^{35}}[\cos(x)]$. **(10 pts)**

   (b) A particle moves along a line with position $s(t) = 2t^3 - 9t^2 + 5$ for $t \geq 0$. Find the acceleration at each time $t > 0$ at which the velocity is 0.

3. The table gives values of f, g and their derivatives. **(10 pts)**

x	$g(x)$	$f''(x)$	$f(x)$	$g'(x)$	$f'(x)$
1	-4	5	2	1	-3
3	2	-1	-3	4	6

   (a) Let $q(x) = \dfrac{g(x)}{f(x)}$. Find $q'(1)$.

   (b) Let $p(x) = x^2 f(x)$. Find $p''(1)$.

4. Find each derivative. **(12 pts)**

(a) $y = \cot(5x^2)$. Find $\dfrac{dy}{dx}$.

(b) $f(x) = \sqrt[3]{(1-4x)^2}$. Find $f'(x)$.

(c) $s = \cos^3(2t)$. Find $\dfrac{ds}{dt}$.

(d) $y = x\sec(x^2)$. Find y'.

5. Figure A5 shows f (solid) and g (dashed), made of segments joined at grid points. **(8 pts)**

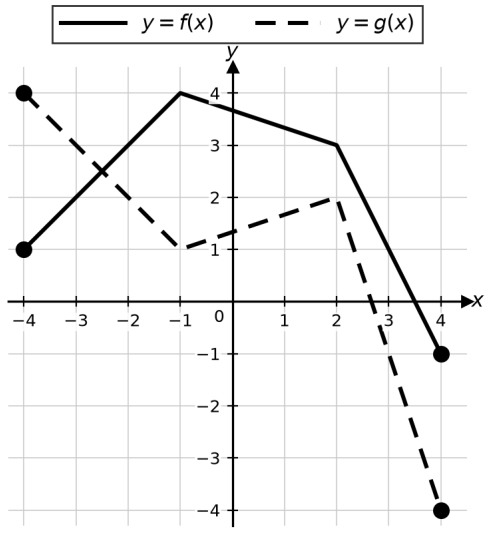


Figure A5

(a) Let $k(x) = f(g(x))$. Find $k'(-3)$.

(b) Let $m(x) = g(f(x))$. Find $m'(-2)$.

6. Let $f(x) = (x^2 - 5)^3$. Find the y-intercept of the line tangent to the graph of f at $x = 2$. **(6 pts)**

7. Find each derivative. **(6 pts)**

(a) $\dfrac{d}{d\left(x^3-\sin(x)\right)}\left[\left(x^3-\sin(x)\right)^5\right]$

(b) $\dfrac{d}{dx}\left[\tan^2(3x)-\sec^2(3x)\right]$

8. Find $\dfrac{dy}{dx}$. **(8 pts)**

(a) $x^2y-\cot(y)=3x$

(b) $(x+y)^2-(x-y)^2=y^2+8$

9. The curve $g(y)+xy=10$ passes through $(2,3)$. The table gives values of g and g'. **(9 pts)**

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

(a) Find $\dfrac{dy}{dx}$ at $(2,3)$.

(b) Find an equation of the line tangent to the curve at $(2,3)$.

10. Find equations of the tangent lines to $x^2 + xy + y^2 = 7$ where $y = 2$. **(7 pts)**

11. In this question only, y is the independent variable and x is a function of y. **(4 pts)**

    For $\sec(x) = y^2 + y$, find $\dfrac{dx}{dy}$.

12. The curve $x^2 + 4y^2 = 20$ passes through $(4, 1)$. Find $\dfrac{d^2y}{dx^2}$ at $(4, 1)$. **(8 pts)**