2.1 Chain Rule: 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. Answers need not be simplified.

1. Find each derivative. **(2 each, 12 pts)**

   (a) $y = (x^2 - 3x + 1)^4$. Find $\dfrac{dy}{dx}$.

   (b) $f(x) = \cos(4x - x^2)$. Find $f'(x)$.

   (c) $y = \tan^3 x$. Find y'.

   (d) Find $\dfrac{d}{dx}\left[\sqrt{x^3 + 6x}\right]$.

   (e) $s(t) = t\,(2t - 5)^3$. Find $\dfrac{ds}{dt}$.

   (f) $h(x) = \dfrac{6}{(1 - 2x)^2}$. Find $h'(x)$.

2. Find each derivative. **(2 each, 6 pts)**

   (a) $f(x) = \left[5 + \sin^2(4x) + \cos^2(4x)\right]^3$. Find $f'(x)$.

   (b) $p(t) = \sqrt{(t+3)^2 - t(t+6)}$. Find $\dfrac{dp}{dt}$.

   (c) Find $\dfrac{d}{d\,(x^5 - 4\sqrt{x} + \sec(3x))}\left[\sin\left(x^5 - 4\sqrt{x} + \sec(3x)\right)\right]$.

3. Let $f(x) = (x+1)^3 - 4$ and $g(x) = \sqrt[3]{x+4} - 1$. **(2 each, 4 pts)**

   (a) Let $h(x) = f(g(x))$. Find $h'(4)$.

   (b) Let $k(x) = g(f(x))$. Find $k'(x)$.

4. In this question, y is the independent variable. The letter x stands for a function of y that is not constant, and $\frac{dx}{dy}$ stands for its derivative. Answers may contain x, y, and $\frac{dx}{dy}$. **(2 each, 4 pts)**

   (a) $f = 3x^5 + 4y$. Find $\frac{df}{dy}$.

   (b) $f = \cos(x^2)$. Find $\frac{df}{dy}$.

5. Figure A5 shows the graphs of f (solid) and g (dashed). Each graph is made of straight line segments that meet at grid points. **(3 each, 6 pts)**

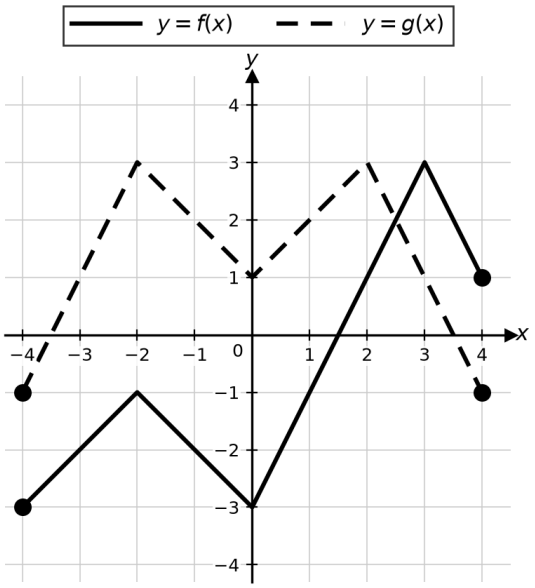


Figure A5

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

   (b) Let $k(x) = g(f(x))$. Find $k'(1)$.

6. The table gives selected values of f, g, and their derivatives. **(3 + 3 + 2, 8 pts)**

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

   (a) Let $h(x) = f(g(x))$. Find $h'(1)$.

   (b) Let $k(t) = [g(t)]^3$. Find $k'(2)$.

   (c) Let $h(x) = f(g(x))$. Find $h(1)$.