

Name Answer Key

Date _____

Calc I H - 2.4 day 3 - Chain Rule with Trig

Period _____

Find the derivative of each given function.

1) $f(x) = \tan(4x^2+3)^5$ Chain Rule x3

$$f'(x) = \sec^2(4x^2+3)^5 \cdot 5(4x^2+3)^4 \cdot 8x$$

$$f'(x) = 40x(4x^2+3)^4 \sec^2(4x^2+3)^5$$

2) $g(x) = \cos^4(7x^2) = (\cos(7x^2))^4$ Chain Rule x3

$$g'(x) = 4(\cos(7x^2))^3 \cdot -\sin(7x^2) \cdot 14x$$

$$g'(x) = -56x \cos^3(7x^2) \sin(7x^2)$$

3) $y = \cot(7x^4-2x)$ Chain Rule

$$y' = -\cot(7x^4-2x) \csc(7x^4-2x) \cdot (28x^3-2)$$

$$y' = -(28x^3-2) \cot(7x^4-2x) \csc(7x^4-2x)$$

4) $y = \sec^5(4x^3) = (\sec(4x^3))^5$ Chain Rule x3

$$y' = 5(\sec(4x^3))^4 \cdot \sec(4x^3) \tan(4x^3) \cdot 12x^2$$

$$y' = 60x^2 \sec^4(4x^3) \cdot \sec(4x^3) \tan(4x^3)$$

$$y' = 60x^2 \sec^5(4x^3) \tan(4x^3)$$

5) $y = \sin(6x^3 + 2)^4$ Chain Rule x3

$$y' = \cos(6x^3 + 2)^4 \cdot 4(6x^3 + 2)^3 \cdot 18x^2$$

$$y' = 72x^2 (6x^3 + 2)^3 \cos(6x^3 + 2)^4$$

6) $\frac{d}{dx}[\sin(4x^2 + 3)]$ Chain Rule

$$= \cos(4x^2 + 3) \cdot 8x$$

$$= 8x \cos(4x^2 + 3)$$

7) $\frac{d}{dx}[\sin(4x^2 + 3)^3]$ Chain Rule x3

$$= \cos(4x^2 + 3)^3 \cdot 3(4x^2 + 3)^2 \cdot 8x$$

$$= 24x (4x^2 + 3)^2 \cos(4x^2 + 3)^3$$

8) $\frac{d}{dx}[\sin^3(4x^2 + 3)] = \frac{d}{dx}(\sin(4x^2 + 3))^3$ Chain Rule x3

$$= 3(\sin(4x^2 + 3))^2 \cdot \cos(4x^2 + 3) \cdot 8x$$

$$= 24x \sin^2(4x^2 + 3) \cos(4x^2 + 3)$$