Name_____

Differentiation - Trigonometric Functions

Date_____ Period_____

Differentiate each function with respect to x.

1) $f(x) = \sin 2x^3$

2) $y = \tan 5x^3$

3) $y = \sec 4x^5$

4) $y = \csc 5x^5$

5) $y = (2x^5 + 3)\cos x^2$

6) $y = \dfrac{-2x^2 - 5}{\cos 2x^3}$

7) $f(x) = \sin^3 x^5$

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

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Differentiate each function with respect to *x*.

1) $f(x) = \sin 2x^3$

$$f'(x) = \cos 2x^3 \cdot 6x^2$$
$$= 6x^2 \cos 2x^3$$

2) $y = \tan 5x^3$

$$\frac{dy}{dx} = \sec^2 5x^3 \cdot 15x^2$$
$$= 15x^2 \cdot \sec^2 5x^3$$

3) $y = \sec 4x^5$

$$\frac{dy}{dx} = \sec 4x^5 \cdot \tan 4x^5 \cdot 20x^4$$
$$= 20x^4 \sec 4x^5 \cdot \tan 4x^5$$

4) $y = \csc 5x^5$

$$\frac{dy}{dx} = -\csc 5x^5 \cdot \cot 5x^5 \cdot 25x^4$$
$$= -25x^4 \csc 5x^5 \cdot \cot 5x^5$$

5) $y = (2x^5 + 3)\cos x^2$

$$\frac{dy}{dx} = (2x^5 + 3) \cdot -1\sin x^2 \cdot 2x + \cos x^2 \cdot 10x^4$$
$$= 2x(-2x^5 \sin x^2 - 3\sin x^2 + 5x^3 \cos x^2)$$

6) $y = \dfrac{-2x^2 - 5}{\cos 2x^3}$

$$\frac{dy}{dx} = \frac{\cos 2x^3 \cdot -4x - (-2x^2 - 5) \cdot -1\sin 2x^3 \cdot 6x^2}{\cos^2 2x^3}$$
$$= \frac{2x(-2\cos 2x^3 - 6x^3 \sin 2x^3 - 15x\sin 2x^3)}{\cos^2 2x^3}$$

7) $f(x) = \sin^3 x^5$

$$f'(x) = 3 \cdot \sin^2 x^5 \cos x^5 \cdot 5x^4$$
$$= 15x^4 \cdot \sin^2 x^5 \cos x^5$$

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

$$f'(x) = -\sin(-3x^2 + 2)^2 \cdot 2(-3x^2 + 2) \cdot -6x$$
$$= 12x\sin(-3x^2 + 2)^2 \cdot (-3x^2 + 2)$$