

Topic: Trigonometric derivatives

Question: Find the derivative of the trigonometric function.

$$y = \sin(3x^2 + 11x)$$

Answer choices:

A $y' = -(6x + 11)\cos(3x^2 + 11x)$

B $y' = -(6x + 11)\sin(3x^2 + 11x)$

C $y' = (6x + 11)\cos(3x^2 + 11x)$

D $y' = (6x + 11)\sin(3x^2 + 11x)$



Solution: C

Set $u = 3x^2 + 11x$ and $u' = 6x + 11$. Then $y = \sin u$, and the derivative is

$$y' = \cos u \cdot u'$$

$$y' = \cos(3x^2 + 11x) \cdot (6x + 11)$$

$$y' = (6x + 11)\cos(3x^2 + 11x)$$



Topic: Trigonometric derivatives

Question: Find the derivative of the trigonometric function.

$$y = 2 \sin x \csc(2x)$$

Answer choices:

A $y' = -4 \sin x \csc(2x) \cot(2x) + 2 \cos x \csc(2x)$

B $y' = -2 \sin x \csc(2x) \cot(2x) + \cos x \csc(2x)$

C $y' = \csc(2x) \cot(2x) + \cos x \csc(2x)$

D $y' = \csc(2x) \cot(2x)$



Solution: A

Use the product rule with

$$f(x) = 2 \sin x$$

$$f'(x) = 2 \cos x$$

and

$$g(x) = \csc(2x)$$

$$g'(x) = -2 \csc(2x) \cot(2x)$$

Then the derivative is

$$y' = f(x)g'(x) + f'(x)g(x)$$

$$y' = (2 \sin x)(-2 \csc(2x) \cot(2x)) + (2 \cos x)(\csc(2x))$$

$$y' = -4 \sin x \csc(2x) \cot(2x) + 2 \cos x \csc(2x)$$



Topic: Trigonometric derivatives**Question:** Find the derivative of the trigonometric function.

$$y = \cot^5(7x)$$

Answer choices:

A $y' = -35 \csc^2(7x) \cot^4(7x)$

B $y' = -35 \csc^2(7x) \cot^2(7x)$

C $y' = -35 \csc^4(7x) \cot^2(7x)$

D $y' = -35 \csc^4(7x) \cot^4(7x)$



Solution: A

Rewrite the trigonometric function.

$$y = (\cot(7x))^5$$

Set $u = \cot(7x)$ and $u' = -7 \csc^2(7x)$. Then $y = u^5$, and the derivative is

$$y' = 5u^4 u'$$

$$y' = 5(\cot(7x))^4(-7 \csc^2(7x))$$

$$y' = -35 \csc^2(7x) \cot^4(7x)$$

