

Derivatives of the remaining trig functions

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Practice problems

1. Find the derivative of $f(x) = 5 \sec(x)$.
2. Find the derivative of $g(x) = \tan(x) + \cos(x)$.
3. Find the derivative of $h(x) = x^2 \cot(x)$.

Solutions

1. Find the derivative of $f(x) = 5 \sec(x)$.

- Identify the constant multiple as 5.
- Recall that the derivative of $\sec(x)$ is $\sec(x) \tan(x)$.
- Apply the linearity rule: $f'(x) = 5 \cdot \frac{d}{dx} \sec(x)$.

Answer: $f'(x) = 5 \sec(x) \tan(x)$

2. Find the derivative of $g(x) = \tan(x) + \cos(x)$.

- Differentiate $\tan(x)$ to get $\sec^2(x)$.
- Differentiate $\cos(x)$ to get $-\sin(x)$.
- Combine the results using the sum rule.

Answer: $g'(x) = \sec^2(x) - \sin(x)$

3. Find the derivative of $h(x) = x^2 \cot(x)$.

- Use the product rule with $u = x^2$ and $v = \cot(x)$.
- Compute $u' = 2x$ and $v' = -\csc^2(x)$.
- Apply the formula $h'(x) = u'v + uv'$.
- Substitute the values: $h'(x) = (2x) \cot(x) + (x^2)(-\csc^2(x))$.

Answer: $h'(x) = 2x \cot(x) - x^2 \csc^2(x)$