

$$\begin{aligned}
g(x) &= \int_{\tan x}^{3x^2} \frac{1}{\sqrt{5+t^3}} dt = \int_{\tan x}^1 \frac{dt}{\sqrt{5+t^3}} + \int_1^{3x^2} \frac{dt}{\sqrt{5+t^3}} \\
&= - \int_1^{\tan x} \frac{dt}{\sqrt{5+t^3}} + \int_1^{3x^2} \frac{dt}{\sqrt{5+t^3}} \\
\Rightarrow g'(x) &= \frac{-1}{\sqrt{5+\tan^3 x}} \frac{d}{dx} (\tan x) + \frac{1}{\sqrt{5+27x^6}} \frac{d}{dx} (3x^2) \\
&= -\frac{\sec^2 x}{\sqrt{5+\tan^3 x}} + \frac{6x}{\sqrt{5+27x^6}}
\end{aligned}$$