12. $h(x) = \dfrac{x^2}{\csc x}$ $\quad P = x^2,\ P' = 2x$ $\quad Q = \csc x,\ Q' = -\csc x \cot x$

$$\frac{P'Q - PQ'}{Q^2}$$

$$h'(x) = \frac{2x \csc x - x^2(-\csc x \cot x)}{(\csc x)^2}$$

$$= \frac{2x \csc x + x^2 \csc x \cot x}{(\csc x)(\csc x)}$$

$$= \frac{x \csc x \left[2 + x \cot x\right]}{(\csc x)(\csc x)}$$

$$= \frac{x(2 + x \cot x)}{\csc x}$$

$$\frac{x\left(2 + x \cdot \frac{\cos x}{\sin x}\right)}{\frac{1}{\sin x}}$$

$$= \frac{x(2\sin x + x\cos x)}{1}$$

$$= x(2\sin x + x\cos x)$$