

Determine the derivatives of the following unless the directions in the problem ask for something else. You may do your work on a separate sheet of paper.

1) Prove  $\frac{d}{dx}[\cot x] = -\csc^2 x \cdot dx$

2) Prove  $\frac{d}{dx}[\csc x] = -\csc x \cot x \cdot dx$

3)  $\frac{d^{80}}{d^{80}x}[\cos 2x] =$

4) Prove  $\frac{d}{dx}[\sec x] = \sec x \tan x \cdot dx$

5)  $\frac{d^2}{d^2x}[\sin^2 x + \cos^2 x] =$

6) Find  $y'$  if  $Y = \cos^2(4x)$

7)  $\frac{d}{dx}\left[\frac{1}{\sin^2 x}\right]$

8) If  $f(x) = 2 \sin x$ , then find  $\frac{d}{dx}(f'(x))$ .

9)  $\frac{d}{dx}[\sin x^2]$

10)  $Y = \sqrt{x \sin x}$

11)  $\frac{d^2}{d^2x}(\sec x)$

12)  $\frac{dy}{dx}[\sin^2(x^2 + 2)]$

### FUN STUFF

13) If  $h(x) = f(g(x))$ , find  $h'(4)$  if  $g(4) = -2$ ,  $g'(4) = -4$ , and  $f'(-2) = 2$ .

14) If  $Y = t^2$  and  $x = 7t + 4$ , find  $\frac{dy}{dx}$ .

15) If  $Y = 2u^2$  and  $u = 4x - 7$ , find  $\frac{dy}{dx}$ .