

## Quiz 8

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

**Question 1.** Find the derivatives of the given functions.

a. (3 marks) §27.2 #9

$$y = -3 \csc \sqrt{2x+3}$$

$$\begin{aligned} a) \quad y' &= +3 \csc \sqrt{2x+3} \cot \sqrt{2x+3} \cdot \frac{1}{2\sqrt{2x+3}} \cdot 2 \\ &= \frac{3 \csc \sqrt{2x+3} \cot \sqrt{2x+3}}{\sqrt{2x+3}} \end{aligned}$$

b. (3 marks) §27.3 #31

$$y = \tan^{-1} \left( \frac{1-t}{1+t} \right)$$

$$= \frac{3 \csc \sqrt{2x+3} \cot \sqrt{2x+3}}{\sqrt{2x+3}}$$

c. (4 marks) §27.5 #

$$y = \sqrt{x^2+1} - \ln \frac{1+\sqrt{x^2+1}}{x}$$

$$b) \quad y' = \frac{1}{1 + \left(\frac{1-t}{1+t}\right)^2} \cdot \left[ \frac{-1(1+t) - (1-t)}{(1+t)^2} \right]$$

$$= \frac{1}{(1+t)^2 + (1-t)^2} \left[ \frac{-1-t-1+t}{1} \right]$$

$$= \frac{-2}{1+2t+t^2+1-2t+t^2}$$

$$= \frac{-2}{2+2t^2} = \frac{-1}{1+t^2}$$

$$c) \quad y = \sqrt{x^2+1} - \ln(1+\sqrt{x^2+1}) + \ln x$$

$$y' = \frac{1}{2\sqrt{x^2+1}} \cdot 2x - \frac{1}{1+\sqrt{x^2+1}} \cdot \frac{1}{2\sqrt{x^2+1}} \cdot 2x + \frac{1}{x}$$

$$= \frac{x(1+\sqrt{x^2+1})x - x^2 + \sqrt{x^2+1}(1+\sqrt{x^2+1})}{x\sqrt{x^2+1}(1+\sqrt{x^2+1})}$$

$$= \frac{x^2 + x^2\sqrt{x^2+1} - x^2 + \sqrt{x^2+1} + x^2 + 1}{x\sqrt{x^2+1}(1+\sqrt{x^2+1})} = \frac{(x^2+1)(1+\sqrt{x^2+1})}{x\sqrt{x^2+1}(1+\sqrt{x^2+1})}$$

$\sqrt{x^2+1} \cdot x$   
" "