

## Quiz 7

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. §3.3 #45 (5 marks) Find the derivative of the function  $f$  and simplify.

$$f(t) = \frac{\sqrt{t+1}}{\sqrt{t^2+1}} = \frac{(t+1)^{1/2}}{(t^2+1)^{1/2}}$$

$$f'(t) = \frac{\frac{d}{dt}[(t+1)^{1/2}] \sqrt{t^2+1} - \sqrt{t+1} \frac{d}{dt}[(t^2+1)^{1/2}]}{[(t^2+1)^{1/2}]^2}$$

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

$$= \frac{\frac{\sqrt{t^2+1}}{2\sqrt{t+1}} - \frac{t\sqrt{t+1}}{\sqrt{t^2+1}}}{t^2+1} \quad \text{LCD} = 2\sqrt{t+1} \cdot \sqrt{t^2+1}$$

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

$$= \frac{-t^2 - 2t + 1}{2\sqrt{t+1}(t^2+1)^{3/2}}$$

Question 2. §12.3 #19 (3 marks) Find the derivative of the function  $f$ .

$$f(x) = x \cos \frac{1}{x}$$

$$f'(x) = \cos \frac{1}{x} + x \left(-\sin \frac{1}{x}\right) \frac{-1}{x^2}$$

$$= \cos \frac{1}{x} + \frac{1}{x} \sin \frac{1}{x}$$

Question 2. §12.3 #13 (2 marks) Find the derivative of the function  $f$ .

$$f(x) = \tan^2 x$$

$$f'(x) = 2 \tan x \cdot \sec^2 x$$