6. (a) Differentiate with respect to x: (i) $x \log x$, (ii) $\sqrt{\frac{1-x}{1+x}}$ giving your answers in as simple a form as possible. [3]

   (b) Is the function $y = 1 + |x|$ (i) continuous at the point where $x = 0$? and (ii) differentiable at the point where $x = 0$? Justify your answers. [3]

   (c) Find the value of [2]

   $$\lim_{x \to 0} \frac{1 - \cos x}{x^2}$$