

Quiz 6

This quiz is graded out of 10 marks. No books or notes are allowed. SHOW ALL YOUR WORK. If you need more space for your answer use the back of the page.

Question 1. (5 marks)

Find the derivative of $f(x) = xe^{\sqrt{x}}$.

$$\begin{aligned} f'(x) &= e^{\sqrt{x}} + e^{\sqrt{x}} \frac{1}{2} x^{-\frac{1}{2}} x \\ &= e^{\sqrt{x}} + \frac{e^{\sqrt{x}} \sqrt{x}}{2} \end{aligned}$$

$$= e^{\sqrt{x}} \left(1 + \frac{\sqrt{x}}{2} \right)$$

Question 2. (5 marks)

Use logarithmic differentiation to find the derivative of $f(x) = \frac{x^3(\sqrt{x+2})}{(x-1)}$

$$y = \frac{x^3 \sqrt{x+2}}{x-1}$$

$$\ln y = \ln \left(\frac{x^3 \sqrt{x+2}}{x-1} \right)$$

$$\ln y = \ln x^3 + \ln \sqrt{x+2} - \ln(x-1)$$

$$\ln y = 3 \ln x + \frac{1}{2} \ln(x+2) - \ln(x-1)$$

$$\frac{1}{y} y' = \frac{3}{x} + \frac{1}{2(x+2)} - \frac{1}{(x-1)}$$

$$y' = y \left(\frac{3}{x} + \frac{1}{2(x+2)} - \frac{1}{x-1} \right)$$

$$= \frac{x^3 \sqrt{x+2}}{x-1} \left(\frac{3}{x} + \frac{1}{2(x+2)} - \frac{1}{x-1} \right)$$