

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 11

Question 1. (3 marks) Find the derivative of $f(x) = (x-1)e^{3x+2}$

$$f'(x) = (1)e^{3x+2} + (x-1)e^{3x+2} \quad (3)$$

Question 2. (5 marks) Use logarithmic differentiation to find the derivative of $f(x) = \frac{(2x-1)^5}{\sqrt{x+1}}$

$$\text{Let } y = \frac{(2x-1)^5}{\sqrt{x+1}} \Rightarrow \ln y = \ln \frac{(2x-1)^5}{\sqrt{x+1}} = 5 \ln(2x-1) - \frac{1}{2} \ln(x+1)$$

$$\therefore \frac{1}{y} \frac{dy}{dx} = \frac{5}{2x-1} \cdot (2) - \frac{1}{2} \cdot \frac{1}{x+1} \cdot (1)$$

$$\Rightarrow \frac{dy}{dx} = y \left[\frac{10}{2x-1} - \frac{1}{2} \cdot \frac{1}{x+1} \right]$$

$$= \frac{(2x-1)^5}{\sqrt{x+1}} \left[\frac{10}{2x-1} - \frac{1}{2} \cdot \frac{1}{x+1} \right]$$

Question 3. (2 marks) Evaluate $\cot(-\frac{\pi}{3})$ and $\csc(\frac{9\pi}{4})$.

$$\cot(-\frac{\pi}{3}) = \frac{\cos(\frac{\pi}{3})}{\sin(\frac{\pi}{3})} = \frac{1/2}{\sqrt{3}/2} = -\frac{1}{\sqrt{3}}$$

$$\csc(\frac{9\pi}{4}) = \frac{1}{\sin(\frac{9\pi}{4})} = \frac{1}{\sin(\frac{\pi}{4})} = \frac{1}{\sqrt{2}/2} = \frac{2}{\sqrt{2}}$$