Name Surname: October 11, 2010

MATH 101-007 Quiz 3

Question. Find the equation of the tangent line to the graph of $y = (2x+9)^{1/2}e^{\sin x}$ at the point with $x_0 = 0$.

Show all your work.

Solution.

$$\begin{aligned} \frac{dy}{dx} &= \frac{1}{2}(2x+9)^{-1/2} \cdot 2 \cdot e^{\sin x} + (2x+9)^{1/2} e^{\sin x} \cos x \\ m_{\text{tangent}} &= \left.\frac{dy}{dx}\right|_{x=0} = 9^{-1/2} e^{\sin 0} + 9^{1/2} e^{\sin 0} \cos 0 \\ &= \frac{1}{3}\, e^0 + 3\, e^0 \cdot 1 = \frac{1}{3} + 3 = \frac{10}{3} \end{aligned}$$

$$x_0 = 0 \Rightarrow y_0 = (2 \cdot 0)^{1/2} e^{\sin 0} = 3.$$

So tangent line's equation is

$$y - 3 = \frac{10}{3}\,(x - 0) \text{ or } y = \frac{10}{3}\,x + 3.$$