4, 2, 2, 2   Total: 10

MATH 135 – Problem Set 6, Part B Solutions

3.6/52 The tangent line is $y - \sin(\theta) = \cos(\theta)(x - \theta)$. 1

This crosses the x-axis when $y = 0$, and there

$$-\sin(\theta) = \cos(\theta)(x - \theta), \quad 1$$

so

$$x = \theta - \frac{\sin(\theta)}{\cos(\theta)} = \theta - \tan(\theta). \quad 1$$

The distance between the point $(\theta, 0)$ and $(\theta - \tan(\theta), 0)$ along the x-axis is

$$|(\theta - \tan(\theta)) - \theta| = |\tan(\theta)|. \quad 1$$

give partial credit 1 for answer but say "show all work" if they don't give what the derivative is for general x by chain Rule

3.7/88. By the Chain Rule, $\frac{d}{dx} e^{f(x)} = e^{f(x)} \cdot f'(x)$. 1

must show this for full credit

From the table, at $x = 4$, this equals

$$\left.\frac{d}{dx} e^{f(x)}\right|_{x=4} = e^{f(4)} \cdot f'(4) = e^0 \cdot 7 = \boxed{7} \quad 1$$

90. By the Chain Rule, $\frac{d}{dx} f(2x + g(x)) = f'(2x + g(x)) \cdot (2 + g'(x))$ 1

must show this for full credit

At $x = 1$, we have by the table:

$$f'(2 + g(1)) \cdot (2 + g'(1)) = f'(6) \cdot 7 = 4 \cdot 7 = \boxed{28} \quad 1$$

3.8/54 By implicit differentiation, from $x^{2/3} + y^{2/3} = 2$,

$$\frac{2}{3} x^{-1/3} + \frac{2}{3} y^{-1/3} \cdot \frac{dy}{dx} = 0, \quad \text{so} \quad \frac{dy}{dx} = \frac{-x^{-1/3}}{y^{-1/3}} \quad 1$$

(the $\frac{2}{3}$'s cancel)

$$\left.\frac{dy}{dx}\right|_{(x,y)=(1,1)} = \frac{-1}{1} = -1.$$ So the tangent line

is $\boxed{y - 1 = -1(x - 1)}$ or $\boxed{y = -x + 2}$. 1