Name: $\mathcal{S}$olutions

(5 points)

Problem 1 .

Given

$$y = \cos(xy).$$

Use implicit differentiation to find $y'(0)$.

Circle the correct answer below:

A.) 1

B.) -1

C.) 0

D.) π

E.) None of the above

$$\frac{d}{dx}(y) = \frac{d}{dx}\left(\cos(xy)\right)$$

$$\Rightarrow \quad y' = -\sin(xy) \cdot \frac{d}{dx}(xy)$$

$$\Rightarrow \quad y' = -\sin(xy)\,(y + xy')$$

Now if $x=0$, we have $\quad y = \cos(y \cdot 0) = \cos(0) = 1$

So $\quad y'(0) = -\sin(0 \cdot 1)\,(1 + 0 \cdot y'(0))$

$$= \underline{\underline{0}}$$

(5 points)

Problem 2 . If

$$f(\theta) = \sin(2\tan(3\theta))$$

what is the value of $f'(0)$.

Circle the correct answer below:

A.) 0

B.) 2

C.) 3

D.) 6

E.) None of the above

$$\frac{d}{d\theta} f(\theta) = \frac{d}{d\theta} \sin(2\tan(3\theta))$$

$$= \cos(2\tan(3\theta)) \cdot \frac{d}{d\theta} (2\tan(3\theta))$$

$$= \cos(2\tan(3\theta)) \; 2 \cdot \sec^2(3\theta) \cdot \frac{d}{d\theta}(3\theta)$$

$$= \cos(2\tan(3\theta)) \cdot 2\sec^2(3\theta) \cdot 3$$

$$f'(\theta) = 6 \cdot \cos(2\tan(3\theta)) \cdot \sec^2(3\theta) .$$

$$f'(0) = 6 \cdot \cos(2\tan(0)) \cdot \sec^2(0)$$

$$= 6 \cos(0) \cdot 1$$

$$= \underline{\underline{6}}$$

$$\sec(0) = \frac{1}{\cos(0)}$$

$$= 1$$