

Name:

Solutions

MAC 2311 - Analytical Geometry and Calculus I

Quiz # 6, February 20, 2024

(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.)  $\pi$

E.) None of the above

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

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

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

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

$$\begin{aligned} \text{So } y'(0) &= -\sin(0 \cdot 1) (1 + 0 \cdot y'(0)) \\ &= \underline{\underline{0}} \end{aligned}$$

(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

$$\begin{aligned} \frac{d}{d\theta} f(\theta) &= \frac{d}{d\theta} \sin(2 \tan(3\theta)) \\ &= \cos(2 \tan(3\theta)) \cdot \frac{d}{d\theta} (2 \tan(3\theta)) \\ &= \cos(2 \tan(3\theta)) \cdot 2 \cdot \sec^2(3\theta) \cdot \frac{d}{d\theta} (3\theta) \\ &= \cos(2 \tan(3\theta)) \cdot 2 \sec^2(3\theta) \cdot 3 \\ f'(\theta) &= 6 \cdot \cos(2 \tan(3\theta)) \cdot \sec^2(3\theta). \end{aligned}$$

$$\begin{aligned} f'(0) &= 6 \cdot \cos(2 \tan(0)) \cdot \sec^2(0) \\ &= 6 \cos(0) \cdot 1 \\ &= 6 \\ &= \underline{\underline{6}} \end{aligned}$$

$$\left. \begin{aligned} \sec(0) &= \frac{1}{\cos(0)} \\ &= 1 \end{aligned} \right|$$